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THE OPERATIONS FOR PRIMARY AND SECONDARY CATARACTS.

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THERE is to-day a peculiar indescribable pleasure in reading the remarks with which v. Gräfe introduced his method of cataract extraction. How quickly every thing has changed! Gräfe very soon overcame the earlier difficulties in his way. The traction instrument, together with the slide-manœuvre, was soon abandoned. Even the very peculiarities upon which v. Gräfe laid so much stress have become of doubtful utility.

The simple flap section, defended by Steffan,[1] as early as 1867, had prevailed; and our present method of operation is neither peripheric nor linear, and even the careful cutting away of bits of iris in the angles of the wound, is no longer observed. A large corneal section and a small iridectomy are now generally preferred.

The linear section, because of its mathematical origin, came with a certain claim of distinction about it which had its influence so long as that prejudice remained in its favor, and the greater facility with which wounds of the sclera healed as compared with those of the transparent cornea, was once an established fact which had reached about the average age of a pathological truth.

Wound suppuration after cataract extraction is, however, induced by the entrance of the cocci of suppuration, and the

[1] Erfahrungen und Studien.

proposition that the limbus conjunctivæ should behave differently, as to the staphycocci, than the transparent cornea, is so improbable that it must first be experimentally proven.

There is one characteristic of scleral sections, however, which does not, as such, belong to corneal sections, namely, the tendency to the formation of cystoid scars.

This von Gräfe regarded as peculiar to glaucoma, but it is also observed in scleral sections for cataract, and is not apt to occur in glaucoma operations if the section be laid in the cornea.

All this, however, shall not weigh as against v. Gräfe, but only as the development of the work begun by him. While Gräfe sought in vain for a name for his method which should be sufficiently descriptive, we cannot do better than call it after his name. Even though we have deviated in some respect from the views originally conceived by him, the essence remains the same, and the v. Gräfe method of cataract extraction will always hold its place in ophthalmology. V. Gräfe himself maintained this claim. The most prominent feature of his operation consists in this: that the delivery of the lens is in every respect different from that in which a large flap is made. In the latter method, tilting of the lens demands a considerable portion of the available space in order that the lens may clear the pupillary border, while it further demands a very large gaping of the wound. In von Gräfe's method the edge of the lens is applied to the corneal wound, and, in consequence, its exit is in a straight line. The sections need be, therefore, only large enough to permit the lens to pass out without great force; but for the very reason that we wish to avoid this waste of space necessitated by the tilting of the lens, an iridectomy is necessary. Since the material difference in the two methods consists in the manner of delivery of the lens, it will be worth while to introduce some comparisons as to the operative procedures which are immediately connected therewith. In this relation comes: 1st. The opening of the capsule with the cystotome as practised by v. Gräfe. 2d. Opening of the posterior capsule in the hyaloid fossa. 3d. Opening of the capsule with the forceps. 4th. Peripheral capsulotomy.

Under all circumstances, the section was made upwards. Its chord lay from 3 to 4 millimetres below the apex of the cornea. Puncture and counter-puncture close to the outer border of the limbus, the section itself lying along the inner border of the same. It is well to examine the cornea carefully, however, before operating, since the line of demarcation between opaque and transparent tissue is not always an ellipse with its longer axis horizontal; the latter may be vertical, and a section made in the usual way will be too small, which is the worst thing that can happen in extraction. The section is made with the narrow knife, the iridectomy is confined to the central portion of the wound, and after incision of the capsule the lens is pushed out by means of a spatula applied close to the lower border of the cornea. In cases of difficult delivery of the lens, gentle counter-pressure should be made by means of a spatula applied to the upper lip of the wound. The removal of cortical remnants is accomplished in like manner. The bandage should be changed several times daily, especially if there be pain, which is often due simply to collection of tears in the conjunctival sac. The only applications made to the eye itself are atropine, and, in case of considerable iritis, moist warmth. The eye should be examined as little as possible during the process of healing.

In the following considerations, I have only included those cases operated upon by me in my private hospital, where the after-treatment was concluded by myself alone. The clinical notes are also my own. If I had wished to include the cases operated upon in the university clinic, the total would have been at least three times as large, but the statistics would have gained nothing in exactness.

The statistics as to cataract operations in a large clinic, year in and year out, are quite untrustworthy. Who will answer for it that particulars of each operation are carefully kept? How easy it is, in the course of a year, for the history of one or more cases to be lost, there being no registrar for the safe-keeping of these documents. Furthermore, the histories are kept generally by the assistants, who frequently change in the course of years. Is it to be supposed

that they all work with the same exactitude and conscientiousness? Finally, however, the clinical history ends when the patient leaves the hospital. Upon his return he belongs to the policlinic, and it is very difficult, indeed impracticable, to follow clinical histories in the policlinic. It will thus appear that the condition noted at the time of the patient's discharge remains unchanged, as far as shown by the history, even though the eye be subsequently lost as the result of the operation; this has a very marked influence upon the percentage of loss, which only records those cases in which the eye was completely lost immediately after the operation. Immediate loss of the eye is less frequent than subsequent loss, the patient having been discharged with $V = \frac{1}{10}$, but becomes blind as the result of chronic choroiditis produced by the operation.

Starting out with the proposition to report upon those cases only which had been operated upon in my private hospital, I find it necessary to make an exception as to those in which peripheral capsulotomy was done. This proceeding is of more recent origin, and I have included in this review those cases so operated upon in the university clinic during the first six months of 1886. I am justified in so including these cases, since I can fully rely upon the completeness and exactness of the clinical histories kept by Dr. Silex and Dr. Beselin.

All cases in which the visual acuteness attained has equalled at least $\frac{1}{6}$, have been classified together as perfect results,—this, with the necessary correcting glasses, but without stenopaic apparatus. V. Gräfe was accustomed to reckon as a perfect result a case in which $V = \frac{1}{10}$. This I do not think quite justifiable, since $V = \frac{1}{10}$ is not sufficient for reading and writing. In some cases vision did not quite equal $\frac{1}{6}$ at the time of discharge of the patient. On the average, three weeks from the time of operation, but in the course of a few weeks or months without any operative interference, vision had so improved that a perfect result had been attained. These cases, as a matter of course, should not be classed with the secondary cataracts.

The second group is made up of the secondary cataract,

i. e., those cases in which the pupillary region is occupied by opacities. In this group are included those cases in which the prognosis of an operation is favorable. Those cases in which perception of light was still good, with field complete, perceiving the motion of the hand, etc., but which, from the circumstances of the case, offered no probability of improvement, are classified with the losses. Those cases have also been reckoned as losses in which, even though they possessed a visual acuteness of greater than $\frac{1}{6}$ at the time of their discharge, yet carried with them the germ of their destruction. He who wishes to shine with brilliant statistics might of course act differently.

(1) The method first recommended by Adam Schmidt, then by Rivaud-Landrau and Hasner, latterly again by Rheindorf,[1] the so-called "Glaskörperstich" (immediate division of the posterior capsule), played a most important rôle in the heated campaign which Hasner had undertaken in favor of the old flap operation. Hasner is not wholly wrong in this; indeed, the old flap extraction has its indications, and I confess that I am beginning again to regard it favorably, with the posterior capsulotomy omitted.

The immediate result of posterior capsulotomy directly after extraction is the gushing forward of vitreous, most frequently with decided dilatation of the pupil, and also in about one third of the cases artificial prolapse of vitreous. This procedure is adopted in the hope that the lips of the incision, not only in the posterior capsule, but in the anterior as well, will be held asunder by the vitreous, and that thereby secondary cataract would be prevented; yet, in many cases after the healing process has been completed, no trace of this incision can be found.

Of course only those cases can be placed in this class in which nothing abnormal has occurred. When, either during or after extraction of the lens, loss of vitreous takes place, then opening of the posterior capsule in the hyaloid fossa was omitted, and the cases were counted among those in which the capsule is opened in the usual way.

[1] "Beobachtunge nüber den Glaskörperstich," Leipzig und Heidelberg, 1881. *Vid.* also Arlt, Operationslehre, "Graefe-Saemisch's Handbuch," p. 272.

Immediate posterior capsulotomy was done in my private practice in 68 cases, in which

(1) V = $\frac{1}{8}$ or more was obtained in . . 40 = 58.8%.
(2) Secondary cataract in . . . . 22 = 32.4%.
Of these a second operation was done in ten cases with result of V = $\frac{1}{8}$ or more; the others never came for further treatment.
(3) Loss . . . . . 6 = 8.8%.

If we count in those cases in which an after-operation brought the vision up to a perfect result, the percentage is increased to 73.5. On the other hand it is not fair to charge the posterior capsulotomy with all the losses, because the element of chance plays a prominent part, as an analysis in detail of the losses would show. Nevertheless it is shown that the expectation, that the necessity for a second operation would be done away with, has not been justified.

(2) Colsmann[1] and Förster[2] proposed to open the capsule by means of a forceps. Their proposition was based upon the evident fact that a piece of capsule removed from the eye could not participate in the formation of secondary cataract. To accomplish this end the capsule forceps is certainly the instrument for the purpose. The attempt to circumcise and then extract a piece of the lens capsule, as described by Couradi[3] as early as 1791, is often little more than pantomime—the capsule is invisible, and once incised the edges gape so that at the second cut it is impossible to tell whether the capsule or simply the exposed lens mass is cut.

At first I used, as Colsmann and Förster had done, a forceps the teeth of which were set on the under surface horizontally without any downward prolongation, and so arranged as to interlock. These forceps, however, did not always seize the capsule, and as I at that time always operated with the patient anæsthetized, I soon became convinced that on account of the complete relaxation of all the

[1] The Removal of a Large Piece of the Anterior Capsule Entire. Wiesbaden, 1879.
[2] These ARCHIVES, 1882, vol. xi., p. 344.
[3] Arlt, Operationslehre, p. 272.

ocular muscles under chloroform narcosis, forceps with teeth projecting downwards would be perfectly practicable. With the upper surface of the forceps-blades the cornea was slightly raised until the forceps were over the anterior pole of the lens; the teeth of the open instrument were then allowed to sink into the capsule, when very often a piece of the capsule of tolerable size was withdrawn. As many as possible of these pieces were collected and sent to Heidelberg for examination. Prof. Becker was kind enough to inform me that frequently pieces of the posterior capsule were also torn away, and the question naturally arose, if prolapse of vitreous did not necessarily occur in these cases. A review of my clinical histories reveals that among twenty cases in which a large piece of the capsule was torn away, there was slight prolapse of vitreous in only four. In those cases in which it was not noted that a large piece of capsule had been withdrawn, prolapse of vitreous occurred three times at the finish of the operation, in attempts to remove lens remnants, or to free a piece of iris wedged in the angle of the wound, an accident such as might occur in the employment of any method. I with Förster am unable to find that prolapse of vitreous is favored by the use of the capsule forceps.

The operation was done in my private practice seventy-eight times; one case must, for the present, be excluded, because extensive detachment of the retina, which existed before the operation, rendered a good result impossible. The healing process was entirely normal, and had it not been for the intraocular complication a good result would have been attained. A computation based on seventy-seven cases gives the following result:

(1) Immediate result, V = $\frac{1}{6}$ or more, . 60 = 78.1 %.

(2) Secondary cataract, ... 10 = 12.9 %.

Of these latter six cases, as the result of a second operation, obtained V = $\frac{1}{6}$ or more. In one case the result was nullified by iritis; the others never presented themselves for operation.

(3) Losses, ... 7 = 9.0 %.

If we count those cases in which, as the result of an after-operation, a perfect result was obtained, and the case in which there was detachment of the retina, which had otherwise been a success, we have a percentage of success equal to 88.

Among the losses one case was counted with V = $\frac{1}{4}$, but which had choroiditis. Two were doomed through wound-infection, in spite of the most careful disinfection of the instruments and washing of the conjunctival sac, once with carbolic acid and once with salicylic acid. In four cases irido-choroiditis was the cause of the blindness.

In the two series just described the losses from irido-choroiditis are materially greater than in the two which follow. This may, however, very well be not in any measure dependent upon the manner of opening the capsule, for in by far the greater number of cases in the two following series corrosive sublimate (1 to 5,000) was used as a disinfectant.

(3) After the discovery of cocaine I again laid aside the capsule-forceps and returned to division of the capsule by means of the cystotome. The division of the capsule was effected as von Gräfe usually did it, by dividing it from below upward along its whole extent on the temporal and medial side of the pupil, and finally by joining the two incisions above by another parallel with the superior border of the lens. A number of cases appear in this series which were operated upon at the time when I was experimenting with posterior capsulotomy (Glaskörperstich), but which for some reason was not considered appropriate, or for the very reason that escape of vitreous had already supervened.

By this method sixty-three eyes were operated upon. Three cases must be left out of the count at present; two of them were complicated with atrophic degeneration of the nerve (not progressive atrophy), but in which vision was improved in so far as the condition would permit. Both cases healed kindly, and if it had not been for the atrophy would have been perfect results. The third case was that of a female patient who was seized with bilious colic at the

end of the second week, and was therefore not in a condition to be examined at the time of her discharge. The course of healing was throughout favorable, and the glasses which were ordered probably gave good vision from data furnished later. Counting sixty cases, then, we have

(1) Immediate result, V = $\frac{1}{6}$, or better . 45 = 75.0 %

(2) Secondary cataract . . . . 13 = 21.66 %

Of these four cases were converted by an after-operation into perfect results; the remainder did not present themselves for further treatment.

(3) Loss . . . . . 2 = 3.33 %

If we count in the three cases with normal healing, and the four cases in which an after-operation gave a perfect result, then we have 76.2 % of perfect results. Of the two cases lost, one had V = $\frac{1}{6}$ at the time of his discharge, but became blind three months afterwards from irido-choroiditis. The second was a cataracta nigra, blind from iridochoroiditis.

(4) Peripheral capsulotomy, first described and done by Gayet,[1] of Lyons, in 1873, and practised chiefly by Knapp since 1878, has found few advocates, because the impression prevailed that a second operation was always necessary to prevent subsequent opacification of the capsule. I postponed my desire to give this method a trial until after I had an opportunity to witness the operation in detail as done by Knapp himself towards the end of the year 1885.

Hence my observations extend over a relatively short period, and therefore the cases operated upon in my private hospital are too few in number to justify a conclusion. I have, as in a former case, included those cases so operated upon by me in the university clinic for the first six months of 1886. As a matter of course only those cases appear in which peripheral capsulotomy was done, and not those, for example, in which the flap extraction was performed, or in which, on account of dislocation of the lens occurring either during the operation or having existed before, the lens was removed in its capsule.

[1] *Arch. f. Augenheilk.*, Bd. vii., S. 203, and Bd. xi., 549.

The operation is very simple. After the section of the cornea has been made and the iridectomy has been done, a sharp cystotome is introduced under the medial border of the iris coloboma, and the capsule is divided parallel to the æquator, to a point under the temporal border. The better result is obtained if the capsule is divided close to the periphery, but on the anterior surface of the lens. In the case of very hard cataracts one may sometimes see a decided rotation of the lens on its sagittal axis, which of course indicates a very loose connection between the lens and its capsule. The exit of the lens is extremely easy; lenticular remnants are removed in the usual way by means of a spatula. Thirty-four cases were operated upon in my hospital by this method. Four of them are excluded from the series. (*a*) A cataract with opacity of the capsule, in which, although peripheral capsulotomy was done, after extraction of the lens the capsule was seized with the capsule forceps and removed; healing perfect with perfect sight. (*b*) Cataract with a high degree of myopia and complicated with choroiditis. Healing normal without secondary cataract; ophthalmoscopic picture perfectly clear; extreme ectasia posterior, and choroiditis at the macula. Vision was much improved as compared with previous condition,—as good as could be obtained taking into account the lesion at the macula. (*c*) Cataract with congenital amblyopia. The operation was desirable because the other eye was blind from detachment of the retina. Healed kindly; fundus clearly visible; vision as good as before development of the cataract. (*d*) Cataract with superadded chronic choroiditis still in the inflammatory stage. The other eye was blind in consequence of an operation for cataract which had been done at the patient's home. Course of healing good; improved vision; still under treatment.

For purpose of comparison, then, we have thirty cases, of which there received:

(*a*) V = $\frac{1}{8}$, and better	26
(*b*) Secondary cataract	4

No loss.

In the university clinic during the first six months of 1886 peripheral capsulotomy was done by me fifty-nine times. Two cases must be excluded from the series on account of great opacity of the vitreous, which in one case surely, and in the other in all probability, existed before the operation. This gives us fifty-seven cases, of which there received:

(*a*) V = $\frac{1}{6}$, and better	43
(*b*) Secondary cataract	13
(*c*) Loss	1

Two of those with secondary cataract had V = $\frac{6}{36}$, but did not read connected type in a satisfactory manner, due probably to awkwardness on their part.

Taken together, we have eighty-seven cases.

(*a*) V = $\frac{1}{6}$, and better . . .	69 = 79.3 %
(*b*) Secondary cataract . . .	17 = 19.6 %
(*c*) Loss.	1 = 1.1 %

The circumstance is a little remarkable that with peripheral capsulotomy, secondary cataract is not only not more but even less frequent than in central laceration of the capsule. In the latter pains are taken to remove the capsule from the pupillary region, while in the former it is allowed to remain undisturbed, and it is really surprising how transparent the two layers of capsule are when superimposed. They are clearly visible under focal illumination, but since they contain no wrinkles or elevations, they do not disturb either vision or the clearness of the inverted image.

I think that Knapp has dwelt a little too much upon the necessary frequency of after-operations in peripheral capsulotomy.

Among the above sixty-nine cases with satisfactory result there are who have:

V = $\frac{1}{2}$	4
V = $\frac{1}{3}$	14
V = $\frac{1}{4}$	20
V = $\frac{1}{5}$	9
V = $\frac{1}{6}$	4

I hold that it is not necessary to do an after-operation

when visual acuteness equal to $\frac{1}{3}$ has been obtained; a patient may be satisfied with $V = \frac{1}{4}$, the majority of them are satisfied with $\frac{1}{6}$. Furthermore, diminished visual acuteness is not always dependent upon opacities in the pupillary region but may be attributable to irregular corneal curvature in some cases. Finally discission of the capsule may be done in three or four weeks after the extraction, when the course of healing has been normal.

There is no essential difference as to the frequency of secondary cataract, or as to visual results, between the method of opening the capsule as practised by v. Gräfe and peripheral capsulotomy, but there is one important circumstance in favor of the latter. In the Gräfe method I have found iritis in one half of the cases, though it is true the inflammation was slight, simple adhesion of the sphincter angles, and isolated points along the pupillary margin, which did not in any measure affect the sight. Secondary cataract, on the contrary, is almost constantly complicated with iritis when the capsule is freely torn in the pupillary region.

In peripheral incision of the capsule it is very different, iritis in these cases being very rare, even though there be secondary cataract.

I do not believe that the incarceration of bits of capsule in the corneal wound, which easily occurs in Gräfe's method, is quite so bad a thing as it is reputed to be. I have seen it so often in entirely normal healing that I am unable to look upon it as such a destructive accident. The rarity of iritis, however, in peripheral incision of the capsule, proves in fact that when the capsule has been freely lacerated in the pupillary space, the rolled-up tips and corners whenever they touch the margin of the iris do give rise to inflammatory reaction and adhesions. Even though a slight iritis may not influence the visual result for the worse, yet a secondary cataract with adherent iris presents a problem by no means as pleasant as when the pupil is free from adhesions. And what assurance have we that an iritis springing up shortly after the operation may not be the starting-point of a destructive irido-choroiditis?

The behavior of an eye after operation does not always

afford undubitable evidence as to the course of healing. Pain is often caused simply by a collection of tears in the conjunctival sac, and disappears upon changing the bandage and washing the eye. Dense secondary cataract may succeed an extraction wherein the healing has been undisturbed, while with other cases, in which spasmodic closure of the lids and extreme upward rotation of the eyeball has effectually prevented any examination of the eye at all, in the end every thing has been found to be all right. Swelling of the lids and chemosis of the scleral conjunctiva are generally evidences of severe inflammation of the interior of the eye, yet they sometimes occur in cases which finally terminate normally. Individual predisposition seems sometimes to come into play here. At least I have seen patients in whom both eyes had been operated upon, and in whom about the second day after the operation the lids on both sides were so swollen, and there was so much inflammatory chemosis of the ocular conjunctiva, that it protruded between the edges of the lids in masses, and yet all went well without any signs of iritis. I do not mean to say that there was no iritis, but only that by the use of atropine synechiæ were prevented. In von Gräfe's method atropine is the only remedy which is of value anyway, in the after-treatment; in severe iritis a bandage moist and warm sometimes has a soothing effect upon the pain. The days in which it was deemed necessary to resort to phlebotomy, or at least to apply a leech or two in every extraction, fortunately are past.

Two cases have been placed among the losses, which would, according to the usual custom, have been classed with the good results, since they had $V\frac{1}{10}$ at the time of discharge. Eight cases would have been classed with the insufficient results because they were discharged with good perception of light, and a fair indication that an after-operation would give them satisfactory vision, which result was in fact realized in some, yet it was not permanent. Only six were discharged as hopeless, and one of these was a very rare case of choroidal hemorrhage immediatety after the operation.

Five losses were occasioned by infection of the wound. Antiseptic precautions were observed in all cases, but cor-

rosive sublimate alone seems to be in any degree trustworthy. A stronger solution than 1 to 5,000 is not well borne. I therefore consider it of importance that this weak solution should be used for a long time. The evening before the operation I usually cause the conjunctival sac to be thoroughly washed out, having the patient with his head dependent, so that the superior cul-de-sac may be the more certainly reached by the sublimate-solution. A pad moistened with the sublimate solution is then fastened over the eye and kept there until the time of the operation. The instruments are of course disinfected, and immediately before the operation the conjunctival sac is again washed out with the sublimate. Since this method of procedure in my private hospital I have had no case of wound infection, but in the university clinic some isolated cases have occurred—in a much greater number of patients it is true, still under much less favorable circumstances; the case of loss in the series with peripheral capsulotomy, for example, belongs here.

The greater number of losses were occasioned by iridochoroiditis, when the introduction of the sublimate as the antiseptic yielded a very unlooked for result. The iridochoroiditis declared itself at once in 7 cases, in 4 cases between the second and third week, and 4 cases were discharged with tolerably good sight.

It may be useful to report briefly a few of these cases.

Mr. M., 60 years of age. Cataracta matura, right. Operated upon Oct. 3, 1881. Capsule opened with cystotome; complete evacuation of the lens; while disengaging the iris, caught in the temporal angle of the wound, a slight loss of vitreous with immediate filling of the anterior chamber took place. During the process of healing there was swelling of the scleral conjunctiva and the borders of the lids; pain particularly at night, and slight haziness of the cornea, moderate atropine mydriasis. On Oct. 30th, with + 11 D V = $\frac{1}{4}$, and with + 15 D, reads 0.8, which, for statistical purposes, is a perfect result, but the swelling of the lids, pericorneal injection, profuse lachrymation, etc., still continued, and when about the end of January, 1882, the patient presented himself again, the pupillary region, although but little diminished in area, was closed by a new-formed membrane;

the iris pushed forward in the form of a shield. The fingers could be counted at a distance of ½ meter. An iridotomy was without result. The lips of the incision did not gape in the least.

Among the losses there is still another case which is worthy of remark on account of its rarity:

Miss L., æt. 77. Cataracta matura, right. Motion of the hand, at 1 metre; projection correct. Operation without accident Feb., 1883, under undisturbed narcosis (immediate posterior capsulotomy). After the bandage had been applied and while the patient was lying quietly on the operating bed, the vitreous suddenly gushed forth from under the bandage. In the evening the pupil was narrow, the anterior chamber empty, the wound gaping. The further progress of the case was without noteworthy indication of inflammation. March 2d the cornea was clear; iris normal, on its lower sector a narrow strip of blood stain; pupillary region not transparent opthalmoscopically; no perception of light.

The posterior capsulotomy cannot be charged with this result, but we had to do with a choroidal hemorrhage occurring immediately after the operation, producing detachment of the retina and expulsion of the vitreous.

I had met just such a case before, in which not only the vitreous but also a profuse hemorrhage gushed from the wound. Such cases are very rare, and are not to be diagnosticated in advance. The predisposition may exist in both eyes.

Finally, another case may be mentioned because of its rarity, in which the eye operated upon is not to be considered as lost, as there is a possibility of bettering the sight by an after-operation; iritis appeared however in the other eye, which may be considered as sympathetic.

Mrs. F., æt. 66. Cataracta matura, left. Operation Nov. 6, 1883, without accident. Capsule opened with the capsule forceps. In a short time a mild iritis appeared, without any particular disturbance to the healing, accompanied, however, with a posterior adhesion of the iris along the lower border of the pupil; at the end of the second week violent iritis. On Jan. 9, 1884, with + 12 D V = $\frac{1}{10}$. Pupillary region for the most part clouded with a thick stain-like secondary cataract. Iridotomy without

result. On Jan. 26th, iritis appeared in the right eye, until now sound, save some opaque striæ in the lens periphery; some isolated dots appeared on Descemet's membrane, and within four weeks vision had been reduced to $\frac{1}{24}$. The treatment consisted simply in instillation of duboisin, atropine not being well borne, lukewarm applications, etc. I saw no reason which would warrant the enucleation of the left eye, especially since its vision was not entirely lost. The iritis in the right eye was obstinate, as is usual in such cases, but got entirely well. In the beginning of July, 1884, vision was $\frac{6}{12}$, as it was before the inflammation. There were a few adhesions; fundus normal. The eye remained well, and on May 1, 1885, the condition above noted remained unchanged. Inasmuch as the left eye had suffered an injury, (extraction) two and a half months before, the disease in the right eye might be called a sympathetic irido-choroiditis, and it is therefore the more important to notice that the inflammation subsided under simple treatment, without enucleation, the patient going about the while.

It is self-evident that extraction does not protect an eye against later manifestations of disease, for as a matter of fact I have seen all the commoner affections in eyes in which extraction had been done. Following is a case in which blindness was caused by an irido-choroiditis that appeared, however, so long after the operation was done, that any causative relation is doubtful.

Mrs. B., æt. 69. Mature cataract, left. Nucleus small, large; swollen cortex; anterior chamber shallow, entirely normal. Operation March 20, 1882. After complete evacuation of the lens, posterior capsulotomy, anterior chamber filled at once. Slight loss of vitreous. Some blood entered the anterior chamber from the conjunctival flap. The course of healing was attended with nothing abnormal, save some slight turgescence of the episcleral vessels.

April 20th.—The following conditions were noted: Pericorneal injection still present; atropine mydriasis good; iris in position, upon its upper portion still a small red coagulum. The pupillary area, on focal illumination, clear, ophthalmoscopically very much clouded; vision with + 11 D, $\frac{1}{36}$. The diffuse cloudiness of the vitreous could only be attributed to choroiditis, and with that diagnosis the patient was sent home.

About the middle of June, 1883, she came again. Pupillary region diminished, distorted in its upper portion and covered with a whitish membrane, the margin of the pupil for the greater part adherent. Atropine produces but little dilatation; with + 11 D V = $\frac{1}{36}$. Iridotomy: the iris was cut from the pupillary border downward and outward and inward to near its insertion. The incisions gaped widely, and at the end of ten days with + 10 D, vision was $\frac{6}{18}$, inverted image clear and normal. How long this condition of affairs continued I do not know. During my vacation, in Aug., 1885, the patient returned. My assistant and substitute noted atrophy of the globe, no perception of light.

Inasmuch as choroiditis was diagnosticated after the first operation, it is fair to presume that, from some unknown cause, she suffered a relapse, and blindness was the result.

The following is a similar case:

Mr. P., æt. 62, was operated in October, 1881 (immediate posterior capsulotomy). When discharged in November, he saw with + 11 D $\frac{1}{3}$, and with + 16 D he read 0.75 with ease. The eye remained in good condition until November, 1882, when a severe inflammation declared itself. Eight days after its beginning the patient presented himself with strongly-pronounced pericorneal injection, cornea and iris normal. Ophthalmoscopically, the vitreous was not transparent, particularly in its lower part, where there was a dense grayish opacity. Fingers could be counted at $\frac{1}{2}$ metre. The larger part of the visual field was wanting upwards and inwards. Treatment without result.

In April, 1883, I saw the patient again. There was a slight hemorrhage in the anterior chamber. The left eye was normal, with some isolated opaque striæ in the lens. Evidently, in this case, there was an acute choroiditis, with detachment of the retina, which had no connection with the operation.

The ordinary form of detachment of the retina, which is usually associated with myopia, also occurred in several cases.

Mr. St., æt. 50, came under treatment in Jan., 1881, on account of long-standing linear opacities at the posterior pole of the lens. Both eyes highly myopic with small posterior ectasia. In Nov., 1881, the cataract in the left eye was completely ripe, operation and course of healing normal, with good vision. An examination

in June, 1882, showed him to have vision $\frac{5}{6}$ to $\frac{6}{6}$ with + 6 D. In Oct., 1884, the patient presented himself again. He had observed a diminution of vision in the left eye for two months. He then had vision of only $\frac{1}{4}$ with + 15 D, and read 0.75 with difficulty. No defect in the visual field, yet there was detachment of the retina downwards. In the right eye, meantime, the lens had become completely opaque. Movements of the hand were seen at a distance of $\frac{1}{2}$ metre. An examination as to perception of light, by means of the ophthalmoscopic mirror, discovered no defect of the field; small quantities of light were perceived in all directions, but projection was faulty.

From the nature of the case, detachment of the retina was very probable, but could not be proven. Normal extraction and course of healing (capsule opened with capsule forceps); suspicion of detachment confirmed. In an examination in May, 1886, it was found that he had a visual acuteness of from $\frac{1}{18}$ to $\frac{1}{12}$; media clear; ophthalmoscopic image distinct; detachment downwards, reaching to the disc.

An interesting but sad case is the following:

Mr. K., 45 years old, had had, for a number of years, complete opacity of the lens of the left eye, perception of light and projection normal. The right eye is myopic, with irregular opaque striæ at the posterior pole. Operation May 28, 1883. A large piece of the capsule was removed by means of the capsule forceps. The lens emerged smoothly and entire; in replacing a piece of iris caught in the medial angle of the wound, a slight escape of vitreous occurred. Course of healing normal. On June 16th, he saw with + 4 D $\frac{5}{12}$, and with + 8 D he read 0.4 to 0.3. The pupil completely dilated; no synechiæ, refractive media entirely transparent without a trace of opacity; ophthalmoscopic image clear; posterior ectasia about the breadth of the disc, with only slight atrophy of the pigment epithelium.

On July 3d I found perfect acuteness of vision with + 4.5 D, and with + 8 D he read 0.3 at 30 *cm*, but, to my horror, I found floating opacities of the vitreous, and in the upper and inner sector a small laceration of the retina, with beginning detachment. It was not until two days later that the patient became aware of his misfortune, showing that, although detachment of the retina usually makes itself known to the patient at once, *i.e.*, as soon as it approaches the posterior pole, it may have existed unobserved at the periphery.

There is yet to mention a case of retinal hemorrhage which occurred three and a half years after an operation normal in every respect, and led to complete blindness, with atrophic degeneration of the nerve.

One of the most remarkable cases, namely, an acute glaucoma, is the following:

Mrs. K., æt. 70, has had for years a mature cataract on the right side, and in November, 1882, came under treatment for a central bullous keratitis, with iritis of that eye (left H = 5.50 V = $\frac{6}{9}$). The iritis healed with two tongue-like synechiæ above and one broader one below. Some corneal opacity was left in the centre.

In June, 1885, the right eye was operated upon. Every thing went well. At the time of discharge with + 12 D her sight had V = $\frac{1}{4}$, with + 16 D she read 0.75. If it had not been for the central opacity of the cornea her sight would have been still better. The sphincter angles are free. The broad adhesion of the lower pupillary border still persists; ophthalmoscopic image distinct. Feb. 8, 1886, the patient came to see me because of pain in the right eye, which had persisted for some weeks. There was only moderate pericorneal injection and diffuse cloudiness of the cornea; most dense in the centre where there were some small infiltrations. Vision corresponding to the corneal opacity was $\frac{1}{12}$ to $\frac{1}{18}$, with + 13 D. I considered it a relapse of the former kerato-iritis, and treated it accordingly. As the patient lived out of town, I did not see her again until March 25th. Haziness of the cornea, with punctate infiltrations and some superficial loss of substance, still persisted.

March 25th.—The cornea was so far clear that an ophthalmoscopic examination was possible. I found, to my astonishment, that there was a deep excavation of the nerve extending to its margin, with spontaneous arterial pulsation. On account of the spasm of the lids which set in every time the eyes were touched, the tension could not be ascertained; but after anæsthesia with cocaine I found decided increase of tension in the right eye. Sight was lost. Only movements of the hand could be distingnished in the outer and upper sectors.

I had not supposed it possible that an eye which a few months before had been the subject of a broad iridectomy could become blind through an acute glaucoma. It contradicts the theories which would ex-

plain the manner in which iridectomy cures glaucoma; but the most vulgar fact is more acceptable to me than the most brilliant theory which cannot be made to agree with said fact.

The other eye, which meantime had become ready for operation, was operated upon by me in the university clinic (peripheral capsulotomy), with normal healing and good sight as the result.

The ophthalmoscopic appearances July 13, 1886, were as follows: Left optic nerve normal; small central depression. Right optic nerve nearly white; excavation extends to the margin on all sides, with distinct bending of the vessels. No perception of light.

I shall only refer to one intraocular complication, which, however, is not a contra-indication, but rather an incentive to operation, namely, opacities of the vitreous. Treatment can be better directed after than before operation.

Mr. N., æt. 66, blind in the right eye since his thirteenth year from injury, atrophy of globe. Right eye has always been near-sighted, and, in addition to some opacities of the cornea, there is mature cataract.

Operation Nov. 7, 1883 (capsule forceps), normal healing.

Nov. 29th.—No trace of iritis; pupillary region on focal illumination clear; ophthalmoscopically, however, almost non-transparent; background cannot be seen on account of dense opacities of the vitreous; vision scarcely $\frac{1}{36}$; visual field complete. A 2 per cent. solution of iodide of potassium was ordered to be used several times a day as an eye-wash.

Feb. 13th.—Slight opacities of the vitreous still remain, with + 7 D he sees $\frac{6}{18}$, and with + 12 D reads 0.5. Ophthalmoscopic image distinct; slight posterior ectasia about half the size of the disc.

In all probability the opacity of the vitreous existed before the operation. I mention this case, however, because I have repeatedly, of course not always, observed a clearing up of opacities of the vitreous in aphakial eyes after the use of the solution of the iodide locally. The iodide may just as well be introduced into the vitreous by absorption through the cornea, when the lens is absent, as by internal administration when the lens is still in the eye. I have not been able to convince myself of the value of the iodide in such cases.

Cataracta complicata and cataracta nigra are closely related. I have found the latter, as mentioned in my Handbook,[1] only in myopic eyes; the myopia is generally associated with choroiditis, even though it may not affect the macula. Arlt[2] also has demonstrated the relation between myopia and cataracta nigra. How this connection comes about we do not know. The greater number of cases of cataract in myopia of high degree, with or without choroiditis, are not to be distinguished from the usual form.

Another complication of great practical importance is dacryocysto-blennorrhœa. I do not usually lose any time with preparatory treatment by means of the sound. A day or two before the operation I open the sac from the outside, and fill it with cotton to check the bleeding and hold the wound wide open. Then an iodoform pencil is introduced into the wound, and renewed once or twice a day. The same treatment is kept up during the course of the healing after extraction, and I have never seen infection ensue.

If we designate with the term ripe that condition of the cataract in which the lens is entirely opaque, we may accurately describe the pathological-anatomical condition; but the clinical conception does not require so much. The question at issue is this: Under what circumstances is it permitted to suppose that the lens may be completely removed, with no portion of it left behind? That a complete opacification of the lens is necessary for the attainment of this end, is a proposition which has been proven false.

Among the cataracts which may be extracted before opacification is complete, the nuclear cataract ranks first—that is, cases in which the opaque, generally yellow or brown nucleus, is sharply defined, either upon focal or ophthalmoscopic illumination, against the transparent cortex. Of course the cortex does not remain permanently transparent. Nuclear cataract develops generally not until after the 50th year; there are, however, exceptions. I have seen nuclear cataract in a child less than a year old, and after discission the nucleus floated around in the anterior chamber like a

[1] Fifth edition, 1885, p. 354.

[2] *V. Gräfe's Arch.*, vol. xxxi., sec. iii., p. 9.

pea. Absorption occurred just as rapidly as in any case of congenital cataract. I have had some cases in persons of 20 or thereabouts, which were operated upon by discission, with good result. It is true the course of healing was a little more protracted than in children, but the possession of a round, movable pupil is well worth a few weeks' waiting and patience. In persons of more advanced age, one of the earliest symptoms of nuclear cataract is the occurrence of myopia in emmetropes, or presbyopes; they are rejoiced to find that they can read without glasses; they have gotten their so-called second sight.

In the beginning the nucleus can be distinguished from the cortex only by its greater refractive power. With a plane mirror the boundary is seen as a sharply defined line. It should be remarked in this connection that in some cases a yellowish-brown reflex may be observed on focal illumination, yet a sharply defined line is not perceived, because the nucleus is too large—its border, especially, when the pupil is not widely dilated, is hidden by the iris. If the nucleus becomes opaque gradually, the visual disturbance is considerable, for even though the nucleus is small, it yet fills the whole area of the pupil, while the cortex is and may remain transparent for years. Under these circumstances longer waiting is without reason. As soon as the vision is so reduced that the patient can no longer find his way about, extraction may at once be done. Even when the cortex is so transparent that after dilatation of the pupil the background of the eye may be distinctly seen, we may confidently expect that the whole lens will come out as a single mass, and without leaving any remnants behind. Because the same process of hardening which preceded opacification in the nucleus has taken place in the cortex, so also the cortex before it becomes opaque will become so hard that it may be loosened from the capsule, and easily expelled.

These cases are so frequent that it is hardly worth while to illustrate them with examples. I will introduce, however, one case, which does not exactly belong here, because the nucleus was not at all so sharply defined as in true nuclear cataract.

Mrs. M., æt. 73, has been near-sighted for a long time, with 16 D sees $\frac{1}{36}$, No. 1.75 is read with difficulty at about 3 *cm* on focal illumination. Some linear striæ are seen in the anterior corticalis, and at the periphery. In the centre of the lens is seen a small grayish-brown reflex, not sharply defined, and coming from the deeper portion ; with the ophthalmoscope likewise, a distinct definition of the nucleus cannot be made out. On the other hand, besides the opacity in the lens, numerous opacities in the vitreous are visible, together with immense posterior ectasia and choroiditis at the macula lutea. The section proved too small, on account of the unusual breadth of the arcus senilis ; the lens was therefore expelled with some difficulty, as a tough, jelly-like mass, and only by means of counter-pressure on the upper lip of the wound. Peripheral capsulotomy was done, course of healing normal. Three weeks after the operation, emmetropia, V $\frac{1}{12}$ and with + 9 D 0.8 was read with difficulty, which was certainly all that could be expected when the disease at the macula is taken into consideration. The pupillary border is entirely free, on focal illumination a fine transparent veil of tissue is seen in the pupillary area, the inverted image is distinct, great posterior ectasia, choroiditis at the macula, opacities of vitreous.

This case of extraction of a lens only slightly opaque leads naturally to the form of incomplete cataract now to be described.

A distinction must be made between certain forms of cortical opacity of the posterior pole and true nuclear cataract. The opacity of the cortex sends back a grayish reflex, it is true, which involves the centre of the lens, but on dilatation of the pupil, neither on focal and still less upon ophthalmoscopic illumination, can a sharp line of definition be made out between nucleus and cortex. Generally, also, there are a greater or lesser number of linear striæ in the region of the æquator. Under these circumstances we can usually, but not with the same certainty as in true nuclear cataract, reckon that the lens will come out entire as a single mass. A few cases may serve as examples.

Mr. G., 56 yrs. old. On focal illumination an opacity about 4 *mm* broad is seen near the middle of the lens, showing a gray reflex, but not with sharply defined borders, before it some barely

recognizable indication of the stellate lenticular figure. In the anterior cortex in the lower part, near the border, a few short radiating opaque lines, the opacity of the posterior cortex is more dense, and lies like a thin, tolerably regular layer immediately upon the posterior surface of the lens. With the exception of these opacities, the lens is entirely transparent, and the color of the fundus shows through it ; details of the fundus cannot be made out. Extraction with peripheral capsulotomy good, delivery of a rather small nucleus, together with the cortex. The pupil immediately afterwards appeared black, and no opacities were visible. Three weeks afterwards with + 10 D he saw $\frac{6}{12}$, and with + 15 D he read 0.5 at 20 *cm.* Inverted image clear and normal.

Mr. K., æt. 54. Has always been short-sighted ; has noticed diminution of sight for a year ; counts fingers at 1 metre. On dilatation of the pupil a grayish opacity about the centre of the lens is seen with oblique light, but there are no defined limits. The anterior portions transparent ; the opacity thickest posteriorly. Ophthalmoscopically the denser opacity is only seen at the posterior pole ; it gradually disappears as the lens border is approached, without there being any line of demarcation. The periphery of the lens is transparent ; isolated striated opacities in the cortex. The disc is seen dimly. Extraction in November, 1885 (capsule opened with capsule forceps). The lens came out smoothly and entire ; good healing without secondary cataract, with convex cylindrical glasses. $V = \frac{1}{4}$.

It is worthy of remark as regards the opacities which begin in the posterior cortex, that, in spite of the small area involved, they occasion very material disturbance of sight, for, be it remembered, the pupillary area at the posterior pole is considerably smaller than at the anterior pole. Therefore, not infrequently there is a striking difference between the ability to make out test-type and the power to read connected print. The latter is often read with much more difficulty than one would have supposed from the tests made with the former. One should, however, not be misled into the supposition that there is some intra-ocular complication because of this condition.

A third form of cataract should be mentioned here, in which there are irregular linear and punctiform opacities contained in transparent lens-substance, and lying generally

in the cortex. These opacities develop sometimes between the twentieth and thirtieth year, usually later, create a good deal of visual disturbance, and are apt to remain a long time without change. Not infrequently capsular cataract is associated with them.

Miss M., 75 years old. Disturbances of vision for ten years, or longer. Counts fingers at 1½ metres. In the pupillary region points and lines are observable immediately under the capsule. Upon mydriasis a few grayish striæ are visible in the anterior cortex, radiating into the pupillary region. In the posterior cortex they are more numerous, and reach almost to the pole, which is occupied by an irregular opacity. The denser masses of striated opacities are found at the periphery. The lens is withal sufficiently transparent, so that the posterior cortical layers can be distinctly seen on oblique illumination; the nucleus is not defined. With the ophthalmoscope numerous transparent spaces are seen between the opacities, but the background is not visible. $V = \frac{1}{36}$. Extraction April, 1883 (capsule forceps). The lens (about 8 *mm* broad) came out as one mass with but little difficulty. The region of the pupil immediately afterwards was black. Three weeks afterwards, with + 10 D V = ⅓; inverted image normal and distinct.

My observations agree completely with those of Alfr. Gräfe,[1] that in certain forms of incomplete cataract, the lens may, without further ado, be removed. Consequently the question suggests itself, when do the indications for artificial ripening after Förster's method begin? In true nuclear cataract and the other forms of incomplete cataract which have been described in the foregoing, Förster's method does not recommend itself, since, while the transparent cortex disengages itself easily and completely from the capsule, artificial ripening brings all the ill consequences of soft cataract with it. In senile cataract the shining sectors of the softened cortex directly under the capsule show that anatomically, indeed, the cataract is ripe, but the softened masses stick to the inner surface of the capsule, and are therefore difficult to remove, or remain behind.

The indications for artificial ripening are present, then, I

[1] *V. Gräfe's Arch.*, Bd. xxx., S. 211.

think, when neither on account of the patient's age nor on the ground of the long existence of the opacities can we presume that the necessary density of the lens has been reached.

A few small striated opacities in the region of the posterior pole, in an otherwise perfectly transparent lens, may incapacitate a man for work in the very heyday of his life, and that we are not under the necessity of postponing the matter *ad calendas graecas* we are in duty bound to thank Förster.

For the success of this method, artificial ripening, it is necessary that there should be a hard nucleus, and that the patient shall at least have passed his thirtieth year; then it succeeds without exception, even without iridectomy, as proven by myself, as well as Meyhöfer.[1] I have resorted to this method to prepare the way for flap extraction without iridectomy.

That preparatory iridectomy as a means of artificial ripening is not in any way to be compared with Förster's method, requires, indeed, but few words to establish. V. Gräfe[2] has observed that sometimes unripe cataracts matured with striking rapidity after a preparatory iridectomy, but this is an exception. I have seen cases enough in which an iridectomy had been done for the purpose of hastening a cataract to maturity without any effect whatever.

I also agree with Gräfe in that a preparatory iridectomy is very seldom indicated, and those who resort to it as a matter of routine generally do more than is necessary. I find such indication only when luxation of the lens, weakened zonula, or fluidity of the anterior portion of the vitreous can be demonstrated. In such cases it is an advantage to be able to proceed with extraction immediately after the completion of the corneal section.

Finally, I conceive it my duty to the memory of v. Gräfe to assert his rights on this subject. Preparatory iridectomy is the heritage of Gräfe's genius, and it is a startling proof

[1] Report on the work done in his eye-clinic for the years 1884 and 1885.

[2] *V. Gräfe's Arch.*, 1862, Bd. viii., 2, S. 258.

of the loose manners which prevail in the literature of to-day, that this method should have been christened with the name of Mooren. As long ago as 1856 v. Gräfe[1] stated the indications governing the combination of iridectomy with the flap section, and in regard to preparatory iridectomy, he expressed himself as follows: "That this method, from the standpoint of security and prophylaxis, would find its defences." That v. Gräfe, as a matter of fact, not only proposed preparatory iridectomy as a possibility, but actually did it when he considered it indicated, is shown by the circumstance that in 1862 he published the fact that immature cataracts ripened in a surprisingly brief time when he had made an iridectomy some time before extraction. In the earlier part of 1863 v. Gräfe,[2] in consequence of this assumption of precedence on the part of Mooren, found it necessary to say: "For those who have only one eye, I have *for several years* adopted this procedure (preparatory iridectomy) as a general or routine method."

Mooren had, in a treatise which appeared in 1862 ("Diminished Danger," etc.), profited by v. Gräfe's idea, without having so much as by a single word indicated the source whence he obtained it. V. Gräfe, in his amiable and unpretentious way, entered his protest in vain. The crowd only hears the trumpet blast.

If there be to-day a tendency toward a revival of the flap section, it is well to remember that the movement comes from France, and is not devoid of a certain patriotic feeling. We too remember, with pleasure, the improvement which was made on the method of Daviel, by Beer and G. A. Richter, toward the end of the last century. The preservation of a round and movable pupil is indeed an end worth striving for. The question is only, under what circumstances in senile cataract we may dare reckon upon the attainment of this end, and what sacrifice we impose upon our patient when we do not succeed? What there is to be said upon the subject has frequently been said. The wide gaping of the wound, which is required for the delivery of

[1] *V. Gräfe's Arch.*, Bd. ii., S. 248.
[2] *Klin. Monatsblätter f. Augenheilk.*, 1863, S. 154.

the lens, has as its natural sequence a corresponding gaping during the course of healing. Prolapse of iris, as Critchett once so neatly put it, at Heidelberg, is the "bête noire" of the flap section, and that prolapse of iris is ten times worse than an iridectomy, few indeed will doubt. Moreover, iridectomy, conjoined with the flap section, is now unnecessary; every advantage is on the side of v. Gräfe's method. We would also have to exclude all those as not fit subjects for this method who, from any cause whatever, could not lie for a long time in bed. Enough to say that the majority of cases of senile cataract are better adapted to the method of v. Gräfe.

In a small number of selected cases in which I had operated upon one eye, according to v. Gräfe's method, I did extraction downward, making the flap section. After completion of the operation I instilled eserine; the patients remained lying quietly for about half an hour until the pupil became small, when they were removed to the bed. Eserine was used for several days. In spite of all this Critchett's "bête noire" did not remain away; in several cases, although there was no prolapse of iris, the latter became adherent to the internal surface of the wound, and even in cases in which there was healing with a round pupil, the visual acuteness was not better than in the other eye which had been operated upon according to v. Gräfe's method. The principal course of diminished vision is the irregularity of curvature of the cornea, produced by cicatricial contraction, which is, if any thing, greater after the flap section than after v. Gräfe's method.

Further, if the classical triangular knife has been the best instrument for more than a hundred years for the flap section, and since we have now come to the point of abandoning the linear incision in senile cataract, and in its place have substituted the small flap section, why not use the knife best adapted to that form of section? V. Gräfe's small knife was especially invented for the linear incision; it has the advantage that it may be easily turned while making the section, but each rotation of the knife means a notch in the course of the wound. In order to insure the

greatest possible evenness of the incision, I use a knife which is two-edged at the point, and 3 *cm* from the point is 5 *mm* in width,[1] and for the rest possesses all the qualities that constitute a good cataract knife.

The conjunctiva should be fixed by means of a fixation forceps at the lower part of the eye, and the forceps handed over to an assistant. The operator then seizes the conjunctiva with a second forceps, without a lock, in the horizontal meridian, and transfixes with the knife at the margin of the cornea, exactly in the direction and position which he desires to maintain during the whole of the section.

The old-time direction to direct the point of the knife to the centre of the pupil, after effecting the puncture, in order thereby to obtain a larger canal of the wound, has no practical value. In making the counter-puncture this manœuvre cannot be maintained, and the extent of the wound is perfectly under our control by laying the chord of the incision at any required distance from the apex of the cornea. After the puncture has been made the knife is held with its back in a straight line 3 to 4 *mm* under the apex of the cornea, and is pushed slowly forward until the opposite side is reached, while the flat of the knife is held unchanged as the instrument advances in the corneal margin. As soon as the point of the knife has reached the nasal side, the handle is depressed towards the temple and the eye is rotated outwards with the fixation forceps, so that the knife shall not pierce the skin at the inner canthus. It should not be forgotten, during the entire time occupied in making the incision to so use the back of the knife as not to allow the aqueous to escape, and when finishing the incision it should not be done with a jerk, but slowly; the bridge of cornea at the last may be divided in the withdrawal of the knife. If desired a conjunctival flap may be formed in this method of incision.

The incision is more difficult in this method than with a smaller knife, but the wound is smoother and more regular.

[1] For the sake of completeness, I will say that Arlt (*v. Gräfe's Arch.*, Bd. xxxii., 4, S. 252) recommends a reduced Beer's knife, which, 3 *cm* from the point, is 2 to 3 *mm* broad. The knife which I use is twice as broad.

By making the incision a little larger so that its base line lies 5 *mm* below the apex of the cornea, it will suffice in many cases for extraction without iridectomy. I have so far operated but little in this manner by flap incision upwards, without iridectomy, because the cases adapted to such procedure are not frequently met with; at any rate the experiment commends itself on its merits, but the cases must be selected. Also in opening the capsule one must endeavor to adapt the method to the conditions existent. In hard cataracts, including the before-mentioned incomplete cataracts as well as in the Morgagnian, peripheral capsulotomy is best. If the cortex is strewn with spokes, and sectors with a silken sheen lying just under the capsule, it is probable that the cortex has been converted into a tenacious mass here and there adherent to the capsule, hence a free opening of the capsule with the cystotome is better; and lastly if capsular cataract be present, the capsule forceps may be preferable.

In ripe cataracts in younger persons, up to about the age of thirty, the linear method of v. Gräfe is indicated. V. Gräfe knew well enough that the section with the lance knife, which he recommended in these cases, was not a linear section, but these cases were just the ones which afforded a test of the highest character for the real linear section. Since the softened lens of a young person may be easily delivered through a wound having an inner length of 5 to 6 *mm*, no difficulty at all is experienced in obtaining a small but truly linear section with a narrow knife.

It is only necessary that all the time while making the section, the knife be so held that the plane of the blade shall pass through the centre of curvature of the cornea. The entire section of course lies in the transparent cornea from 2 to 3 *mm* below its upper border. It is noteworthy that this incision has the same quality as the flap section—it gapes very easily, as well during the delivery of the lens as during the course of healing. This, however, is on no account an advantage. These soft lenses have by no means a uniform consistency, some portions are always less soft than others, and do not come out so readily. If

we then endeavor to expel the retained portions by means of gentle pressure, the consequence of this wide gaping is that vitreous may present in the wound and bring the operation to an end. Furthermore, during the period of healing the iris may fall into the wound and become incarcerated. In consequence of these accidents I have naturally abandoned the linear incision, even here where it is generally practicable.

I make use of a broad lance-knife, such as was used by Critchett for his cataract operations.

I introduce the knife about 1 *mm* below the upper border of the cornea and push it gently forward parallel to the plane of the iris until its point is very near the lower angle of the iris; the knife is then slowly withdrawn. Exactly the circumstance that the internal wound is less peripheral than the outer, and thus therefore the wound of the cornea is broader than it is in the linear incision, is the cause why the wound gapes less easily, which is an advantage, not only so far as the delivery of the lens is concerned, but also as to the process of healing.

After opening the capsule the fixation forceps had better be given to an assistant, and while gentle pressure is used from below upwards, at the same time with a second spatula exert slight pressure on the upper lip of the wound to produce gaping and easier expulsion of the lens.

If it be wished to induce *artificial ripening*, the best method is to perform a discission a few days before the extraction.

For zonular cataract also, a similar method is to be recommended. It is not in every case of discission of lamellar cataract that there is rapid and considerable swelling of the cortex. Often the swelling and opacity are slight, the absorption follows slowly, and after from four to six weeks it ceases entirely, and the discission must be repeated until finally at the end of three to four months the entire lens is disposed of. In other cases, however, great swelling immediately succeeds the discission, whether the opening in the capsule be large or small, the anterior chamber is filled with lens matter, sometimes even the posterior cortex together with

the nucleus may be forced through the pupil, so great is the swelling, and generally in the course of a few days a condition of greater or lesser irritation ensues. It is best, however, not to wait for this, but as soon as the anterior chamber is pretty well filled with lens-substance, to do linear extraction, under full narcosis, of course, since the subject is generally a child whom we cannot trust to hold still. We cannot certainly always expect to remove the whole of the lens but much time is gained by the operation.

The principal point at issue in *zonular cataract is whether an operation is really necessary or not*, which can only be decided by very careful and repeated visual tests before the operation. It is indefensible to operate on children for zonular cataract before they have reached an age when the necessary tests of vision can be made. Any child can see enough for this in spite of a zonular cataract. It is also only by careful examination that one-sided congenital amblyopia, not by any means so infrequent in zonular cataract, can be excluded. If the vision is as much as $\frac{1}{6}$ or more, which is as much as is found in many cases of astigmatism, etc., then an operation is not indicated; if the vision is so poor that it would disable the person from earning his living, then no choice is left but to operate, but the only practicable method is discission. Iridectomy is to be rejected absolutely in every case of zonular cataract; the best that can be expected of it is a slight diminution of vision.

An iridectomy for optical purposes is based on fundamental error, inasmuch as the given optical conditions are not taken into account, and the entire transparent cornea is considered as of equal value. The central portion of the cornea only is useful for optical purposes; the pupillary region, for direct vision. It is only necessary to examine the peripheral portions of the cornea—that is, the pupillary region in an optical iridectomy,—with a keratoscope, to be convinced how irregular and distorted the image is, and the catoptric error is naturally a dioptric error also. Similar conditions probably prevail in the lens. In zonular cataract there is another consequence to be taken into consideration, *i. e.*, the very uncovering of the transparent border of the

lens may render the retinal images worse, because of the irregular refraction which must take place on the borders of the opaque parts of the lens. Added to this there is the greater visual disturbance consequent upon enlargement of the pupil, which always greatly exceeds the piece of iris cut out.

Quite exceptionally, one may sometimes be under the necessity of forming a pupil for optical purposes, in zonular cataract, and then iridotomy is by far the better method. Such a case was that of a woman of 37, who had for twenty years or longer obtained some poor improvement of vision by means of atropine, but had at last reached a state when atropine or any other mydriatic could not be borne. An iridotomy from the pupillary border to near the insertion of the iris, afforded her all the improvement of vision which atropine had given her. The advantage of iridotomy is this, that the pupil thus formed becomes so narrow toward the periphery that the irregular refraction is as much as possible avoided; the refractive error at the border of the opaque portion of the lens of course remains the same as in atropine mydriasis.

The indication for iridotomy, the lens being present, is rare. I have always done the operation with the scissors, not with de Wecker's pince-ciseaux in which the axis of rotation lies about 5 *cm* from the beginning of the cutting edge, but with an English model in which the axis of rotation lies hardly 10 *cm* behind the rounded point. I have never wounded the capsule with this instrument.

In congenital cataract discission alone is the fitting operation. I have already mentioned that the operation will fail, when there is congenital amblyopia, *i. e.*, if there be congenital amblyopia and not amblyopia from disuse, which in my opinion does not exist at all.[1]

I have not been able to persuade myself of the value of iridectomy conjoined with discission, praised so highly by v. Gräfe; discission loses thereby exactly the advantage which is its greatest recommendation, a round and movable pupil. Even though the pupil be narrow and not responsive

[1] Klinische Untersuchungen über das Schielen. Berlin, 1881, S. 102.

to atropine, I have never seen any ill results from omitting the iridectomy.

It is customary to designate any opacity remaining in the pupillary area, after complete or partial removal of the lens, as secondary cataract; hence divers conditions come under this common heading.

In the strictest sense of the word, secondary cataract belongs to those opacities which develop gradually, and only one or two years after complete removal of the lens. The vision, which had been good, sinks to $\frac{1}{12}$, or even to $\frac{1}{36}$, and the printed page is read even with greater difficulty. Under focal illumination a delicate membrane is found to fill the pupillary space, showing generally a number of folds and irregularities of thickness. The disturbance of vision thus produced is much greater than would be supposed on direct examination; it is, however, produced not so much by want of transparency, but much more by irregular refraction. This is best seen on illumination with a plane mirror, especially when a slight rotary motion is imparted to the glass. The inverted image seems to be covered with a veil, and by slightly moving the convex glass the peculiar apparent movements seen in irregular astigmatism are brought out. In corroboration it is found that a marked improvement of vision is always attained by the use of a stenopaic apparatus. The development of this thin membrane is probably owing to the activity of the intra-capsular cells. I have seen it after all methods of extraction, excepting of course when the capsule had been entirely removed. It occurs even when a large piece of the anterior capsule has been removed. This proliferation of the intracapsular cells does not invariably occur. I have watched many cases for many years without observing the slightest trace of secondary cataract. How it will be in this respect as regards peripheral capsulotomy, I cannot say, since the cases as yet are too few to form conclusions.

The best method of getting rid of the disturbance of vision is discission of the membrane with two needles, after Bournan's method, which amounts to simple laceration. I have, however, found it here, as in all needle operations in

secondary cataract, to be more practical to use, not the usual thin needle, but a two-edged cutting needle, having a breadth of 2 *mm*, 5 *mm* from the point, the cutting edge itself having a length of about 8 *mm*. In using the ordinary thin needle, it is not infrequent that the membrane spreads out like a spider's web, and when the needles are withdrawn, comes together again. The broad needles offer an advantage in that we may count upon making a wide opening in the membrane.

If the iridectomy has been made upward, it is better to make the incision of the secondary cataract vertical. The operator takes position on the temporal side of the patient, while the light is arranged to fall from the nasal side upon the eye. A bright lamp-flame and lens, or electric light, is preferable to daylight as a rule. The needles are introduced near the upper and the lower borders of the cornea and meet with their points close above the margin of the pupil, and are depressed until their greatest breadth lies within the plane of the membrane. The handles are then approached to each other, and the points effect the necessary laceration in the place best adapted to the optical necessities.

Extraction of the secondary cataract by means of the forceps is also practicable here.

A second form of secondary cataract consists in great part of opaque lens-substance, *e. g.*, as after traumatic cataract, or incomplete removal of the lens in extraction. We need not be in too great a hurry to operate upon such cases; sometimes a few months bring very great improvement. For example:

Mr. B. has had for twenty years irregular opacities of the lens on both sides. The lens is strewn with numerous small striæ which are especially thick towards the margins and the posterior cortex; right, extraction with immediate good result; left, extraction May 13, '84, operation regular, large piece of anterior capsule removed by means of capsule forceps. The lens came out smoothly and apparently entire. June 2d. Left pupil widely dilated, post. synechia at the temporal angle of the sphincter. The pupillary region covered with a large light-colored membrane, which is transparent ophthalmoscopically only at the borders,

V = $\frac{1}{36}$, same as before the operation. The patient was discharged with a prospect of an after-operation, which was, however, not necessary, for by the middle of October, 1884, V = $\frac{1}{2}$ with 12 D in the left eye, and in the pupillary area only a thin transparent membrane was visible.

The opacities which remain in the area of the pupil, after extraction, when the capsule has been opened with the cystotome, or the forceps, consist of the rolled and folded remains of the capsule, portions of lens-matter, and the products of iritis. At the points of adhesion between the margin of the pupil and the secondary cataract, heavy stringy opacities are always seen stretching into the pupillary space. These adhesions of the secondary cataract to the iris give rise to unpleasant difficulties when it comes to a second operation, and it is a material advantage possessed by the method of a peripheral capsulotomy, that these complications are usually absent.

The method of operation to be chosen is materially influenced by the condition of the iris. If there be a sufficiently open pupil, we may elect to split the capsule, or to remove it. In the first of these it is often better to tear the membrane with two needles. The broad double-edged needles before mentioned offer the advantage that the membrane may be actually cut, though usually it is only torn. These delicate tissues, as a rule, cannot be divided even with the keenest-edged knife. The resistance which they offer being so very slight, they hang loosely from the zonula and tear there on the slightest provocation, and the vitreous offers no obstacle to the knife. If we wish really to cut a secondary cataract, then the best instrument is the iridotomy scissors.

For dense secondary cataract, extraction is often the preferable method. The anterior chamber is opened by means of the lance-knife, and we then seek to seize the membrane with the forceps, to do which is not so easy as it seems, since it will often evade the forceps as it does the knife. The forceps, with heretofore described teeth projecting downward, is best adapted to this work. Extraction of secondary cataract has by no means the evil consequences which have

been feared for it. A deleterious influence on the ciliary body I have never observed, even in a great number of cases. Injurious traction on the ciliary body seldom occurs, because in actual extraction of the secondary cataract it is not generally torn from its attachment to that body. As a rule, only the portion seized is brought away. Therefore it is advisable to seize the membrane as close to the margin of the pupil as possible, as it may happen that an opening too small and too high up may result.

The more extensive the adhesions are between pupillary margin and membrane, the more necessary it is to consider the iris in our plan of after-operations, wherein we have iridectomy and iridotomy to choose from. In either case we must free the area of the artificial pupil from secondary cataract. In iridotomy it is more effective to divide the secondary cataract at the same time with the iris, and in order to surely do this it is necessary to make an opening in the membrane beforehand with the lance-knife. After having opened the anterior chamber the knife is withdrawn only so far that its point may still remain in the wound, and then after the aqueous has flowed out, its blade may be sunk into the secondary cataract. Through the opening thus made, one blade of the iridotomy scissors is introduced behind the iris, and it is cut through toward the temporal and medial sides. [The author intends that a V-shaped cut shall be made.—Trans.] The wound generally gapes at once, and the tongue of iris left in the middle is drawn towards the periphery. Ordinarily it remains so, but exceptionally the opening is closed by iritis. In such a case we must try what can be done by an iridectomy.

The worst form of secondary cataract is that in which the membrane is composed in greater part of an inflammatory new-formation. Such cases sometimes show three or four weeks after the operation a pretty clear pupil with tolerably good sight, yet there may exist at the time iritis, or iridochoroiditis (with implication of the ciliary body of course). In the course of a few months the pupil is drawn upwards, and the pupillary area closed by a new-formed membrane.

The fact that in many such cases an iridectomy is with-

out result, gave rise to the revival of the older method of iridotomy. An iridectomy and likewise an iridotomy are fruitless, because the posterior surface of the iris is covered with a thick layer of new-formed tissue.

In iridotomy we count on the elastic tension of the iris to produce the necessary gaping. But the new-formed membrane on the posterior surface of the iris, formed probably by a proliferation of the uveal pigment cells, is inelastic, and when cut, the sides remain in apposition like a sheet of paper, and immediately grow together again. This condition may be diagnosticated with certainty when the pupil in a aphakial eye has been closed by an iritis, and the iris is pushed forward in the form of a blunt and ridged cone. The depressions between the knob-like projections indicate that there are denser cord-like masses on the posterior surface of the iris which operate as tractors.

If the iris lies on a level and the anterior chamber has its normal depth, although the presence of a new-formed membrane on its posterior surface cannot be excluded, nevertheless we should try the effect of an iridectomy or an iridotomy. The less the pupillary space is encroached upon by the light-colored pseudo-membrane, and the fewer its adhesions to the margin of the pupil, the less it is narrowed and drawn upward, the more favorable is the outlook for a useful result from an operation.

TWO CASES OF VERTICAL NYSTAGMUS.

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ASIDE from the rare occurrence of cases of vertical nystagmus, the following two possess some points of interest which would seem to make them worthy of being put on record.

Miss Elizabeth L., æt. 21, came to the Dispensary of the New York Ophthalmic and Aural Institute to be examined for glasses, as she had great difficulty in following her vocation of school-teacher on account of her imperfect vision. The sight of her right eye had been poor as long as she could remember, while that of the left was fair, and sufficient for ordinary purposes.

Examination of the right eye showed marked vertical nystagmus, the eye making rapid oscillations about a horizontal axis, with occasionally a brief pause of not more than one or two seconds' duration. The left eye was apparently not affected at all, as no motion could be detected with the naked eye; when, however, it was examined with the ophthalmoscope, this eye also was found to make small vertical oscillations, which scarcely exceeded in amplitude the breadth of the retinal blood-vessels.

As the patient was in a very nervous and excited state, I asked her to come again on the following morning, when she might be examined unaffected by the more or less exciting scenes of the dispensary. The following conditions were then found, besides the nystagmus already mentioned: Both corneæ perfectly clear, nothing abnormal in the iris, lens, and fundus. V in the right eye $\frac{20}{100}$, with $-1D^c-2D^c$ ax $0°$ $\frac{20}{60}$; in the left $V=\frac{20}{40}$, which with $-3D^c$ ax $15°$ could be raised to $\frac{20}{30}+$. The nystagmus was less marked than on the day before, and in the left eye no motion at

all could be detected at first, even under the magnifying power of the ophthalmoscope; but after keeping the instrument to the eye for about a minute, slight oscillations began, which lasted only a few seconds, were followed by a pause of about a second, and then began again. When the left eye was covered, and the right forced to fix, the nystagmus ceased; it also ceased when the visual axes converged to a point 5 or 6″ distant, in accordance with the observation frequently made, that strong convergence causes either entire cessation of the oscillations, or at least greatly subdues them.

No cause could be discovered in her history to which the nystagmus might be traced. She is one of seven children, and is the only one thus affected. Both her parents had healthy eyes, and were not consanguineous. The patient has now been under observation more than two years, and no perceptible change has occurred in her condition, except that when she is excited the nystagmus in the left eye increases sufficiently to become visible to the naked eye on close inspection.

Isaac J., æt. 11, was brought to the dispensary on account of convergent strabismus and of nystagmus of the left eye. The mother claimed that the former was the result of great efforts at convergence with which he and other boys had amused themselves four years ago; the latter condition had always existed. The vertical nystagmus of the left eye was very marked, the eye making rapid oscillations about a horizontal axis with only a momentary pause every few seconds. The right eye was apparently not affected at all. When, however, the ophthalmoscope was brought into use, it showed that in this eye also there were slight oscillations about a horizontal axis, which seemed to be synchronous with those of the other eye. V in the left eye $\frac{15}{60}$, with + 1D^c ax 90° $\frac{15}{30}$; in the right V = $\frac{15}{15}$, the same with + 1D. When the right eye was closed and he was forced to fix with the left, he declared, before a question had been put to him, that the letters he was looking at "seemed to jump up and down." This, however, did not last long, for when soon afterwards the experiment was repeated, it failed. When the left eye was forced to fix, the nystagmus ceased and was not transferred to the other eye; it also ceased when the eyes converged to a point 4″ distant. Both corneæ were perfectly clear, nor was there any thing abnormal in the lens, vitreous, or fundus. The boy had had measles and croup, but his general health was good. He has two brothers

and one sister, whose eyes are healthy; those of his parents are also normal.

The interesting point in both of these cases is found in the fact that nystagmus of one eye was of such low degree that but for the use of the ophthalmoscope it would have escaped detection. Monocular nystagmus is of very rare occurrence, only a few such cases having been reported, in almost all of which the oscillations took place in a strictly vertical direction. It would therefore not surprise me if in some of these cases the other eye had also been affected, though only to a slight extent and not constantly. In horizontal nystagmus both eyes are always affected, and in the same degree; at least I have not been able to find any observations to the contrary recorded, if we except statements by Priestley Smith and Dransart, who remark that both eyes are not always affected to the same extent, without however confining the statement to any particular kind of nystagmus.

It is very likely that a centre of co-ordination governing the movements of the eyes exists in each hemisphere, and that both are in such close connection that a disturbance in one produces an exactly corresponding amount of disturbance in the other; when, however, the eyes are not affected to an equal extent, we must either admit that this connection is not so close as not occasionally to be broken, or assume with Priestley Smith an unequal disturbance of function in the centres of co-ordination governing the combined movements of the eye.

It is also interesting to note the excellent vision which both patients had in the eye which was only slightly affected, although in the case of the young lady there was considerable astigmatism. The usual belief is that congenital poor vision is always associated with nystagmus; but this I think holds true only of the higher degrees; lower degrees are not often met with, and are more readily overlooked, especially in the pressure of work entailed by a large dispensary. I cannot believe that the astigmatism had any thing to do with the development of nystagmus in

the first case, for if it did, why do we not meet with cases of nystagmus more frequently? Astigmatism is certainly common enough! I would rather refer it to some central cause, the intensity of which was easily increased by even slight excitement; but what this cause was or how it acted cannot readily be explained. A microscopical examination of the nuclei governing the action of the muscles might cast some light on the etiology of these obscure cases of nystagmus, but the chances of securing an autopsy of such a case are naturally very slight; in the meantime all theories in regard to them have but very slight foundations in fact to rest upon.

AN INSTRUMENT FOR TESTING REFRACTION AND ITS ERRORS, THE STRENGTH OF THE RECTI MUSCLES, AND THEIR INSUFFICIENCY.

By WARD A. HOLDEN, A.M., M.D., Cincinnati, Ohio.

THE instrument consists of a thin brass disc 85 *mm* in diameter, rotating on a stand adjustable in height. On each side of the disc is a clip for holding lenses, each allowing 90° rotation of the lens. On one side of the disc in addition to the clip, is a groove in which a lens of oblong shape can be slipped laterally. In the centre of the disc is

FIG. I.

The disc with its clip for holding lenses, the sliding disc with the slit and two small perforations, and the large perforation open for insufficiency tests.

a perforation 9 *mm* in diameter. A small sliding disc slips before and covers the large perforation. This small secondary disc has at one place a vertical slit and at another place two perforations each 1 *mm* in diameter and 4 *mm* apart.

The lenses used are a cylinder of + 7 D and one of — 7 D, and a prism of 6°. These are similar to the ordinary test lenses, and slip into the clips where they may rotate 90°. In addition, there is a — 10 D cylinder cut into an oblong shape, which slides laterally in the groove on the disc.

The tests for refraction and its errors.

The tests are made by rotating the cylinders of 7 D (the + cylinder in testing hypermetropia and the — cylinder in testing myopia) before the disc with the two small perforations placed horizontally, while the patient looks through them with one eye at a light 6 *m* distant. The cylinders are placed at right angles to each other and two horizontal

FIG. 2.

The disc on its stand with a cylinder in the clip, and the small perforations in place for refractive tests.

images are seen. When either cylinder is rotated, one image revolves about the other and the images come into a vertical line. Then when the + cylinder is rotated, one image revolves about the other, and at that point in the rotation where the images become vertical, a pointer on the cylinder indicates on a calculated scale marked on the disc, the amount of hypermetropia in dioptries in the horizontal

meridian. When the — cylinder is rotated and the images become vertical, the pointer on that cylinder indicates the amount of myopia in the horizontal meridian, on a calculated scale marked on the other side of the disc.

The principle of the tests for refraction.

A cylinder of + 7 D has in its axial diameter a refractive power of 0. In the diameter at right angles to the axial, the refractive power is + 7 D. Then starting from the axial diameter the refractive power constantly increases in successive diameters, from 0 in the axial to + 7 D in the diameter at right angles to the axial. The refractive effect

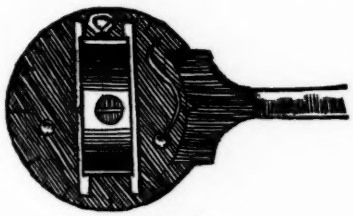

FIG. 3.

The reverse of the disc showing the oblong cylinder in its groove, and the vertical slit in position for muscle strength-tests.

then of a cylinder of + 7 D, rotating through 90° with a stenopaic disc before it, is the effect of a series of + sphericals ranging from 0 D to + 7 D; and similarly the effect of a — cylinder rotating, is the effect of a series of — sphericals. But the revolving cylinder with the slit disc is useless in visual tests with letters, on account of the spherical aberration of the cylinder which blurs the image, and on account of the prismatic effect of the cylinder which displaces the image. The rotating cylinder would be of use, however, in a test which the spherical aberration and prismatic displacement would not affect: In the tests with lights instead of letters, where not the distinctness but the position of images is to be determined, the spherical aberration would not affect the test, and the prismatic displacement could be estimated and even utilized.

In Scheiner's experiment two pencils of light from a dis-

tant object enter the eye through different parts of the cornea. The axes of the pencils come practically parallel, and as they do not pass through the optic centre of the lens, the pencils are deflected, and form on the retina of the emmetropic eye two superimposed images, which appear single. In the hypermetropic eye the deflection of the pencils is not sufficient to bring the two images together, and they form double images. In myopia the pencils cross before reaching the retina, and also form double images.

To illustrate this experiment simply, a card, having two small perforations not further apart than the diameter of the pupil, is held before the eye, and through the perforations a distant light is observed. If the eye is emmetropic in the meridian corresponding to the perforations, the light is seen single. If the eye is hypermetropic, crossed double images result; and if it is myopic, homonymous double images are seen. By slipping a tinted glass before one perforation, it is easily determined whether the images are crossed or homonymous. Then sphericals are placed before the perforations until one is found which renders the image single, and this lens corrects the ametropia in that meridian of the eye. Then, after turning the card, the test may be repeated in successive meridians. The slipping of a number of lenses before the eye is a tedious process however, and often perhaps requires more time than the ordinary tests with the types and test lenses.

If a strong cylinder is slipped before the disc of the instrument, having that diameter whose refractive power corrects the ametropia of the observer in line with the two perforations, we should get a single image were it not for the prismatic effect of the cylinder. If the line of the perforations is horizontal, the correcting diameter of the cylinder brings the two images not together, but *into a vertical line.* The refractive power of the cylinder produces the lateral correction which brings the two images to a vertical line, and the prismatic effect of the cylinder produces the vertical displacement. The refractive power of any diameter of a + cylinder then, is readily determined practically by finding the — spherical which will overcome the

lateral displacement of the images which the cylinder causes and bring the two into a vertical line.

If the radius of curvature of the surface in the required diameter is found, and the refractive index of the glass is known, the refractive power may be computed by the formula $\frac{1}{F} : \frac{1}{r} + \frac{1}{r'} :: n-1 : 1$. F is the focal distance of the lens, r and r' are the radii of curvature of the two surfaces of the lens, and n is the refractive index of the glass of which the lens is made. In a plano-concave cylinder, r', the radius of curvature of the plane surface, is infinity, and $\frac{1}{r'}$ therefore is equal to 0. Then knowing the value of r the radius of

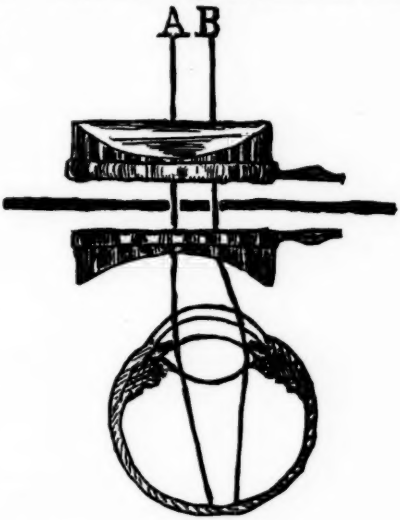

FIG. 4.

The figure shows the + cylinder at 0 on the scale, not affecting the direction of pencils A and B, while the cylinder is at right angles and deflects pencil B coming through the eccentric perforation of the disc, and the pencils form two images on the retina.

curvature and n the refractive index, F the focal distance, the power of the cylinder, is found by $\frac{1}{F} : \frac{1}{r} :: n-1 : 1$.

After finding the refractive power of various diameters a scale may be made on the disc, and as the cylinder revolves before the perforations, when the images become vertical, a pointer on the cylinder will indicate on the scale the amount of refractive error.

A + and a − cylinder of 7 D are placed at right angles to each other in the clips, one on each side of the disc. Then no matter what his refractive condition, when the patient looks through the perforations with the axis of the + cylinder at 0 on the scale, he sees two horizontal images, and as the cylinder is rotated they become vertical. If there is hypermetropia, they become vertical before the end of the scale is reached. If there is no hypermetropia, the images become vertical or run together only when the end of the scale is reached. If the latter is the case, the cylinders are again placed at right angles, and the cylinder is rotated in the same manner, and the amount or absence of myopia is determined.

The action and uses of the test for refraction and its errors.

Since hypermetropia is the most frequent refractive error, the patient is first tested for this, and if it is excluded he is tested for myopia. The patient is seated before a high table or shelf on which the instrument is placed, and the stand is adjusted to the height of the eye. One eye is now closed, and the patient looks with the other through the two horizontal perforations, at a small light 6 *m* distant. Two horizontal images of the light are seen, and when the + cylinder is rotated, if the images become vertical before the end of the scale is reached, there is hypermetropia in the horizontal meridian, and its amount is read off the scale. If the images become vertical only when the end of the scale is reached, there is no hypermetropia in the horizontal meridian, and the − cylinder is then rotated, and when the images become vertical, the amount of myopia in the horizontal meridian is read off the scale. If the images here become vertical only when the end of the scale is reached, there is no myopia. We have now determined the refractive condition of the horizontal meridian.

The disc is next rotated 90° making the perforations vertical, and the vertical meridian of the eye is tested. The images appear vertical and when the + cylinder is rotated they become horizontal, and the amount of hypermetropia

in the vertical meridian is read off the scale. If the images become horizontal only when the end of the scale is reached, there is no hypermetropia, and the — cylinder is then rotated, and when the images become horizontal, the myopia is read off the scale, or if the end of the scale is reached, there is no myopia. We have now the refractive condition of the horizontal and vertical meridians of the eye.

If the error is of the same amount in both meridians, the case is either one of simple hypermetropia or myopia, or *possibly* a case of astigmatism with the principal meridians at 45° and 135°. If the amount of error is different in the two meridians, there is astigmatism present, and we have the refraction in the 0° and 90° meridians. As a large propor-

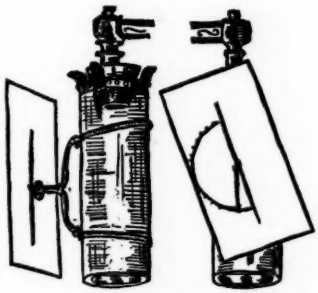

FIG. 5.

tion of astigmatic cases have their principal meridians at 0° and 90°, or a few degrees from these, cylinders of the strength we have found by the instrument are taken from the test case and put at 0° and 90° in a test frame. If now the patient reads $\frac{20}{20}$ by the Snellen types, the astigmatism is at 0° and 90°, and we have determined it. If the patient does not read $\frac{20}{20}$, he probably will, after slight alterations of the axis and strength of the cylinders. If we do not get the correction at once, we proceed to find the meridians of greatest and least curvature, and to test them in the following way.

In testing astigmatism in oblique angles, a rotating black-

ened disc 150 *mm* in length and 80 *mm* in width is used. This has a central perforation and a narrow slit, 80 *mm* in length, running longitudinally through the perforation. The wire frame supporting this disc slips over the chimney of the ordinary argand burner used in the tests, and permits the light to come to the patient only through the perforation and the slit. During the previous tests this disc may have been used, the slit being covered, leaving only the perforation, which makes a small and sharp image. The patient is now directed to look at the perforation with the naked eye, and according to the old experiment a ray of light will be seen running from the perforation, at an angle corresponding to one of the principal meridians of his eye. The slit is now uncovered, and the disc is turned so that the slit falls into this angle. The angle may also be found by the test of the radiating lines. A needle on the disc indicates on a scale the angle of the slit in degrees. The disc of the instrument proper is turned to the same angle by a scale on it. The patient looks through the two oblique perforations and sees two oblique images of the small light, each with a line of light through it parallel to the other. As the cylinders are now rotated the images revolve, and the two lines approach each other until both lights appear on a single line, and the refraction in the meridian at this angle is read off the scale on the disc. Then the blackened disc before the light is rotated 90°, and the disc of the instrument is rotated 90°, and a similar test is made, and we have the refraction of the two principal meridians.

The perforations in the disc are made, one central and one eccentric, so the pencil of light coming through the central perforation is never deflected by the cylinders, and the image it forms on the retina remains fixed when the cylinders are rotated, while the image from the pencil coming through the eccentric perforation revolves about the other.

The instrument may be looked through from either side, and in testing hypermetropia the — side is placed next the eye, so that the operator may rotate the + cylinder readily,

and when myopia is tested, the instrument is turned the other way.

In speaking of the principle of the instrument and its utility, it may be well to compare it with other instruments for a similar purpose. Prof. Thomson's ametrometer has been considered the best of the optometers based on Scheiner's experiment. He uses the simple disc with two perforations in a frame before the eye, and has an improved arrangement by means of a movable gas jet of finding the distance apart of the double images, and from this distance and the fact that the images are crossed or homonymous, as shown by holding a tinted glass before one perforation, he determines the kind and degree of ametropia. The involuntary acts of accommodation however impair the test, and the ciliary muscle must be paralyzed.

There are two methods of measuring ametropia by Scheiner's experiment, first, by finding the distance apart of the images, and second, by finding the lens which will bring the two images together. The first method has been made more accurate by Prof. Thomson's improvement without changing the principle of the test. Instruments utilizing the second method have all used a series of sphericals, as was originally done. The instrument here presented is the first, based on Scheiner's experiment, that has simplified the determination of refraction by means of the correcting lens.

The Culbertson prisoptometer, it is claimed, will test latent hypermetropia without paralysis of the ciliary muscle. This instrument consists of a double prism, *i. e.*, two prisms placed bases together in a stand through which a distant circular disc 220 *mm* in diameter is looked at. Two images of the disc are seen. In emmetropia the two images are tangent to each other, in hypermetropia the images overlap, and in myopia they are apart. Lenses from a trial case are slipped into the clips of the instrument until one is found which renders the two images tangent, and this is the lens required to correct the ametropia.

If a light were looked at through the prisoptometer, the two images would be near together or superimposed in hypermetropia, and homonymously double in emmetropia

and myopia. The double prism lets two pencils of light fall on different parts of the cornea, and is really Scheiner's experiment with prisms before the perforations which converge the parallel pencils before they enter the eye. It is, then, an improvement when the object disc is used, as hypermetropia and myopia may be distinguished without the use of tinted glasses to find whether the images are crossed or homonymous. But there is no necessity for the double prism. A strong + cylinder or even a + spherical before two perforations in a disc has, of course, the same effect. And to perform the test simply, a + spherical of a strength corresponding to the diameter and distance of the object disc, may be slipped into the stationary clip of a trial frame, and a match or any other narrow body placed in the rotating clip so as to pass before the centre of the pupil of the eye. Two images will be seen, and lenses from the test case may be held before the frame until one is found which renders the two images tangent. Then, if the match is rotated, the refraction of other meridians may be tested in the same way, and the angles read off the scale on the test frame.

The prisoptometer, it is claimed, will bring out latent hypermetropia, if a spherical of + 7 D is placed in the clip, and — sphericals are slipped before it until the correction is made by the combination. For example, when there is a latent hypermetropia of + 1 D, if the simple instrument is taken, a lens of + 1 D will not make the correction, but if a + 7 D lens be first placed in the instrument and then a lens of — 6 D be slipped before it, this combination, which is equal to + 1 D, will make the correction. What possible difference there could be in the result, whether the + 1 D was obtained by a spherical of + 1 D, or by a combination of sphericals of + 7 D and — 6 D, or by two sphericals of + .5 D, or any other combination, is difficult to understand. The effect of the + 7 D spherical is to increase the convergence of the pencils, and this would be more easily accomplished by making the prism a few degrees stronger. Then the lens which renders the two images tangent could be subtracted from + 7 D, and the result would be the amount

of hypermetropia. But this will not bring out latent hypermetropia.

There has been much confusion from confounding *facultative* and *latent* hypermetropia. In facultative hypermetropia the patient reads $\frac{20}{20}$ with the naked eye, and also reads $\frac{20}{20}$ with a + lens. For example, before a mydriatic is used, a patient reads $\frac{20}{20}$ with the naked eye, and also reads $\frac{20}{20}$ with a lens of + 1 D. Under mydriasis his vision is only $\frac{20}{40}$, and becomes $\frac{20}{20}$ by using a lens of + 1 D. But after mydriasis has passed off, he still accepts the + 1 D and reads $\frac{20}{20}$ with it, while he again reads $\frac{20}{20}$ with the naked eye. This is the history of a large proportion of hypermetropic cases, but it is facultative hypermetropia only. Had there been any latent hypermetropia, a stronger lens than + 1 D would have been accepted under mydriasis.

With the ophthalmoscope, a facultative hypermetropia may be generally made out without mydriasis. This facultative hypermetropia is generally made out by the instrument under consideration, and probably by any optometer based on Scheiner's experiment. But truly latent hypermetropia is probably not made out by the ophthalmoscope before mydriasis, nor by any instrument based on Scheiner's experiment, although, if the prisoptometer will show it, of course any instrument based on Scheiner's experiment will. Dr. Culbertson has prepared a lengthy table of cases of hypermetropia, which he tested under mydriasis by the types and test lenses some years ago, and which he has lately tested by his prisoptometer without mydriasis, and he finds in most cases the same results. From this he concludes that the prisoptometer will test latent hypermetropia. The cases were mostly slight degrees of hypermetropia, where we should expect only a facultative hypermetropia, and what makes it seem more probable that nearly every case was simply a case of facultative hypermetropia, is that in two cases where he had found the hypermetropia considerable under mydriasis, the prisoptometer did not show the total amount. These cases had beyond a doubt some latent hypermetropia, which the prisoptometer could not show. Dr. Culbertson, however, explains them

by supposing that in these cases the hypermetropia had decreased some few dioptries since he first tested them a year or two before. If he is correct in his explanation, these cases of a *retrogressive* hypermetropia are of considerable interest, and should be looked into further.

When we try to measure the distance between the horizontal images in Scheiner's experiment, unless the ciliary muscle is paralyzed, the involuntary acts of accommodation change the relative positions of the images and render the test inaccurate in many cases, but in the instrument under consideration, where the distance of images apart is not determined, and images are not brought together but into a vertical line, acts of accommodation rarely disturb the test. If they should, it is easily detected by rotating the cylinder two or three times and seeing whether the results are the same. The instrument then acts well as a phakometer, by holding the lens to be tested before it, and making the test for the strength of a + lens by rotating the — cylinder, and *vice versa;* and by turning the lens, any diameter may be tried, and so even crossed cylinders may readily be tested.

The refraction in the 0° and 90° meridians is determined with a simple light without the blackened disc before it, and in the great majority of cases this is all we care to know, to put on the correcting lenses. Practically, then, the instrument is complete in itself, requiring no slipping on of test-case lenses. It is simple in construction, works with a maximum rapidity, and requires a minimum amount of intelligence on the part of the patient.

The test for finding the prism—overcoming strength of the recti muscles.

The cylinders used for refractive tests are taken out of the clips, the small disc is slipped so that the vertical slit is in the centre of the instrument, and a cylinder of — 10 D cut in a quadrilateral form 12 *mm* wide in the line of its axis and 36 *mm* long, is placed in a groove in which it slides laterally before the vertical slit. The axis is placed in line with the slit, and a distant light is observed with one eye

looking through the slit and the other outside of the instrument. A single image of the light is seen, and as the lens is slowly slipped outward, at some point double images appear, which run some distance apart and cannot be fused again. Then on a scale on the instrument is indicated in degrees the strength of prism which the external muscles will overcome. The lens is then slipped inward, and in the same manner the strength of the internal muscles is read off the scale when double images appear. The whole disc may be rotated 90°, and in a similar way the superior and inferior muscles tested.

The principle of the test for finding the strength of the recti muscles.

The deflecting power of a prism depends on the angle between its surfaces, and this power increases as the angle increases. The prismatic effect of any point on a plano-cylindrical lens, is the effect of a prism one of whose surfaces is tangent to the cylindrical surface of the lens at that point, and the other, the plane surface of the lens. Starting then in the center of the cylinder, and going in the diameter at right angles to the axis, every point has a peculiar prismatic power, increasing as we reach the periphery. Thus a cylinder slipped past a slit parallel to its axis, has the effect of a series of increasing prisms. A cylindrical lens of 10 D, 36 *mm* in diameter, has at its periphery a prismatic power of 20°. A weaker cylinder would have to be greater in diameter to have 20° of prismatic effect, but it is immaterial whether a + or a — cylinder is used.

When the cylinder is pushed to the end of the scale and the images are still single, the muscles are able to overcome more than a 20° prism. If the internal recti are able to overcome 20°, they are sufficiently strong and it is practically never necessary to test them further.

If we ever care to go beyond this, a supplementary strong prism from the trial case is placed in the other clip, or before the other eye, and its degree added to the degree indicated on the scale.

The action and uses of the test for finding the strength of the recti muscles.

The lens is placed with its axis over the slit, and has then no prismatic effect. When it is slipped in either direction, it acts as a series of increasing prisms. When a horizontal prism is held before one eye and the other left open, two horizontal images are seen at first, which may run together if the prism is not too strong for the muscles. With this instrument, when the lens is slowly moved the eyes continually adjust themselves to the increasing prism, and the image remains single until the strongest prism is reached that the muscles can overcome, and when the lens is moved beyond this, the images fly apart and cannot be fused again.

It takes some little time to place a series of test-case prisms before an eye, and the repeated efforts to fuse the images cause fatigue, but this instrument tests the strength of the internal and external, and even the superior and inferior recti, quickly and accurately with little effort on the part of the patient.

The test for insufficiency of the recti muscles.

The small disc is slipped aside leaving the large perforation in the centre of the instrument, and a 6° prism is placed base upward in one of the clips.

The patient looking with one eye through the perforation, and with the other outside of the instrument at a distant light, sees two images. If the images are exactly vertical, there is no insufficiency. If the images are oblique, the prism is rotated base inward until the images come into a vertical line, and then the degree of insufficiency is read off a scale on the disc. The ordinary line with a central dot is used in a similar test for insufficiency for near objects. Then the disc is rotated 90°, and the images will appear horizontal if the superior and inferior recti are balanced. If the images are oblique, the prism is rotated until the images become horizontal, and the degree of insufficiency of the superior or inferior recti is read off the scale.

If the images are fused, when the prism is placed hori-

zontal, a supplementary strong prism is slipped into the other clip, and the scale is not altered.

In testing the internal recti, if the images show any tendency toward oscillation, a supplementary prism may be placed vertical in the other clip, and the images will be seen further apart and oscillation will not occur.

The principle of the test for insufficiency of the recti.

A prism placed base downward before an eye produces an upward vertical displacement of the observed image. And if the prism is rotated from its position with base inferior, to a position with base internal, the images describes a 90° arc of a circle, whose centre is the true position of the

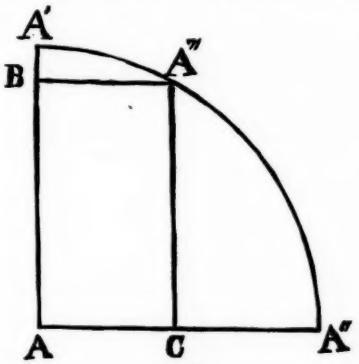

FIG. 6.

image. A prism placed oblique then has the effect of a prism placed vertical, combined with a prism placed horizontal.

For example take a prism which will displace the image A to A′, when placed vertical, and which will displace image A to A″, when placed horizontal. Then if the prism is rotated, the displaced image will describe the arc A′A‴A″. If the prism is rotated 30° from the vertical, the image will appear at A‴. Now let a horizontal prism be taken that will displace A to C, which distance AC is equal to BA‴, the sine of 30°, and let another prism be held vertical that will displace A to B, which distance is equal to A‴C,

the cosine of 30°, and the resultant effect of this combination of prisms will be the displacement of A to A‴. Thus the displacing effect of an oblique prism is equal to the resultant effect of a horizontal and a vertical prism.

Taking then a given prism in an oblique direction, we can, from the position of the displaced image, compute the vertical and lateral displacement, and we can determine the strength of horizontal and vertical prisms necessary to produce the displacement.

In tests for insufficiency of the internal recti, the strength of the vertical prism is immaterial, the amount of lateral displacement alone interesting us. If a strong prism is placed vertical before one eye of a person having insufficiency, the

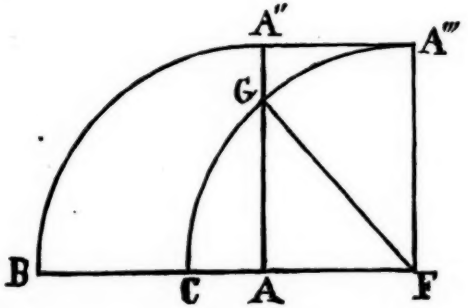

image will be obliquely displaced, and when the prism is rotated base inward the image will describe an arc, which intersects the vertical line from the true image seen with the other eye.

Let A be the true image, then if a prism be placed vertical before an eye the image A is displaced to A″, and if the prism is rotated the false image describes the arc A″B whose centre is A. Now if there is an insufficiency of the internal recti, the image is displaced to A‴, the prism producing the vertical displacement AA″ and the insufficiency producing the lateral displacement A″A‴. Let the prism be rotated, and the false image describes the arc A‴GC whose centre is F which is distant horizontally from A, the distance A″A‴. Now if the prism is rotated until its axis is in the

line FG, the false image moves from A''' to G, and the false image at G, and the true image seen with the other eye at A, are in a vertical line.

The oblique prism here has the effect of a combined vertical and a horizontal prism. The vertical prism is the one that would displace A to G, and the horizontal prism is the one that would displace F to A, *i. e.*, the one that would correct the insufficiency.

The horizontal displacing power of a prism at any angle may be determined by estimating the strength of a prism necessary to produce a displacement equal to the sine of the angle. The horizontal displacing power is readily found arbitrarily, by placing horizontal prisms with bases the other way until one is found which corrects the horizontal displacement and brings the two images into a vertical line. The horizontal prismatic effect of the given prism at a number of angles is found, and a scale is made on the disc. Then as the prism is rotated, at the point where the two images become vertical, the degree of insufficiency is indicated on the scale by a pointer on the prism.

The action and uses of the test for insufficiency of the recti muscles.

The usual test, by placing a vertical prism before the eye, and then slipping successive horizontal prisms before that, is often very tedious, and as the different prisms are used the eyes become fatigued, the false image oscillates, and an accurate test is impossible. By the instrument, the internal recti, and also the superior and inferior recti, are tested readily and accurately.

The tests for insufficiency might also be made by using the two cylinders in slides at right angles to each other, one producing vertical displacement of the image, and the other sliding laterally, acting as a series of horizontal prisms. But by using the rotating prism, the test is perhaps simpler, although the tests for refraction, for muscle strength, and for insufficiency might all be made with one + and one − cylinder.

NOTE.—After this manuscript had been finished and passed into other hands, a friend who read it referred me to a paper by Dr. R. Berlin, in *Klinische Monatsblätter für Augenheilkunde* for 1871, page 34, which in my ignorance of the German literature had been overlooked. In this paper Dr. Berlin shows how a rotating prism might be used for insufficiency tests.

His method was never practically useful. The present instrument it seems proper to present, since by modifications of the idea which Dr. Berlin first advanced, a theoretical principle has been made a practical test.

His method is briefly as follows: A 16° prism was rotated in a frame which was held before the eye. When this prism was rotated 3.3° from the vertical, it had the horizontal displacing power of a 1° prism. When rotated 45° it had the horizontal effect of a prism of about 12°, and of a vertical prism of 12°. When rotated so that the vertical effect was less than that of a ten or twelve degree prism, he found that in many cases an oscillation occurred, and an accurate test was impossible. To avoid this difficulty, he was obliged to use a prism as strong as 16°. But the stronger the prism used, the less the rotation required to produce a degree of horizontal effect, and the less the rotation, the less accurate was the test. And since a rotation of 3° on a small scale made a difference of 1° in the horizontal prismatic effect, and since most cases of insufficiency are of three or four degrees only, it is easy to understand why his method was of no practical value.

The two essential conditions, then, for a practical test with the rotating prism are, first, a wide vertical separation of the two images at all times during the rotation, and second, a scale which shall have a considerable number of degrees to each degree of horizontal effect. While working out the present instrument independently, it was seen that a weak prism did not give the first essential, and that a strong one failed of the second. It occurred then to add a stationary prism of 10°, with axis vertical.

Thus the first condition was fulfilled, as when the rotating prism was turned even to the horizontal, the images were still separated the distance produced by a 10° prism. A prism of 6° was then rotated, and when at 90° from the vertical, it had the effect of 6° of horizontal prism. Thus it took 15° rotation of this prism to give 1° of horizontal effect, making the scale nearly five times larger than the scale of Dr. Berlin, and fulfilling the second condition. And if it were ever necessary to test an insufficiency of more than 6°, an additional prism could be placed before the other eye, and its degree added to the degree indicated on the scale.

AMYLOID IN THE CORNEA OF A STAPHYLOMATOUS EYE.

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Abridged and translated by H. KNAPP.

(*With plates iii. and iv.*)

BEFORE the enucleation of the eye, a yellow discoloration was noticed in the centre of the cornea. The microsopic examination showed it to be caused by what has been called colloid of the cornea, yet with this difference, that the iodine reaction demonstrated it to be amyloid. The occurrence of amyloid in the cornea has once only, by Frisch, been recorded. The degeneration in our case was limited to the cornea.

The eyeball had been removed (by Prof. O. Becker, in Heidelberg, who kindly gave it me for examination), from a man, 21 years of age, who, in his sixth year, had suffered from phlyctenular ophthalmia, immediately followed by enlargement of the globe.

The freshly enucleated eyeball measured 37 *mm* in its antero-posterior diameter, by 27 *mm* in the equator. The enlargement was chiefly due to the so-called intercalary portion of the sclera. The alterations of the membranes were those usual in high degrees of corneo-scleral staphyloma.

Microscopically, the superficial layers of the cornea proper, a new-formed subepithelial stratum, and here and there also the corneal epithelium, are infiltrated by *peculiar, homogeneous, highly refractive, organic masses.* Bowman's mem-

brane is defective, only small portions of it being found here and there (*d* fig. 1, 2, 3, 4, on plates iii. and iv.) A new-formed connective tissue layer, as wide as the epithelial layer, separates the epithelium from Bowman's membrane. Its ground substance is pervaded by a network of fine, anastomosing tubes, the walls of which contain elongated nuclei. The fine tubes, consequently, were capillary blood-vessels (fig. 2, *c*, plate iii.). In other places the ground substance contains spindle-shaped or stellate cells, with communicating offsets (fig. 4, *c*, pl. iv.). The ground substance may assume also a fibrous structure, with a striation parallel to the surface of the cornea, and freely interspersed with fusiform cells (fig. 3, *c*, pl. iii.). Where Bowman's membrane is preserved, it separates this layer, in general, from the corneal tissue, and the long lines of the hyaline deposit; in some places, however (fig. 1, *d*, pl. iii.), it undulates through the middle of the fibrous layer.

The subepithelial cicatricial layer, at some points, broadens (fig. 1, pl. iii. on the right, and fig. 5, pl. iv.), and gradually merges into the regular arrangement of the corneal lamellæ. It contains but few cells, but a great many tightly filled blood-vessels. The extraneous deposits vary in size and shape. The smaller appear as mere round dots, strewed into the substance like granules of inorganic substance, for instance chalk (fig. 6, pl. iv.); the middle-sized are round or oval, like fat globules (fig. 5, pl. iv.); the larger form irregular lumps, some of which are fissured or broken (fig. 4, pl. iv.).

These *homogeneous formations showed the typical amyloid reaction by iodine solution and iodine violet*, whereas by gentian violet and methyl violet, the reaction was indistinct. Iodine produced in a few minutes a dark mahogany color. Addition of concentrated or diluted sulphuric acid, according to Virchow and Böttcher's method, rendered them darker, but produced no changing of color. Other reagents brought out no characteristic alterations.

Concerning the origin of amyloid in the tissue, pictures like figure 6 on plate iv. in our case seem to be conclusive. The high magnifying power (Zeiss' oil immersion) rendered the single corneal lamellæ distinctly visible, so that the

smallest amyloid formations, from mere, scarcely perceptible dots up to larger globules, were seen in them, not between them. The accumulation of larger masses near the surface, and of smaller ones in the deeper layers of the cornea (fig. 6, also fig. 5, on pl. iv.), seems to indicate that the morbid process originated in the outer layers and progressed toward the inner. In the case under consideration, it was not possible to detect a relation of the amyloid deposits to cells, as has been described by Leber, Hippel, Mandelstamm, and Bozowitsch (*Graefe's Archiv*, vol. xxv.). These authors, having found amyloid lumps surrounded by an envelope, which contained one or two nuclei, pronounce the amyloid to be a product of these cells. The walls of the new-formed blood-vessels in the cornea were free from amyloid degeneration. Raehlmann[1] observed in the conjunctiva, besides true amyloid, masses of like external aspect, but staining only yellow by iodine. He therefore considers them as a hyaline preliminary stage of amyloid. Our specimen showed no such distinction, all the deposits, even the smallest granules, stained uniformly dark brown.

Frisch[2] states that amyloid, in rare cases, occurs in my cotic keratitis of the rabbit. Lumps yielding the characteristic reaction, were enclosed in the fixed corneal corpuscles, probably as a product of the protoplasm, a condition totally different from that in the case under consideration.

Colloid and chalky deposits, similar in appearance to amyloid, have been noticed in various affections of the cornea, and described by many authors,—Goldzieher, Saemisch, Wedland Bock, von Graefe, Bowman, Nettleship, Alt, and others.

Our case shows amyloid degeneration of the cornea as a local affection; the same as is met with in the conjunctiva. It did not originate in the cells, but showed a degeneration of the fibres, not as a diffuse alteration of their contents (amyloid imbibition of connective tissue, resembling sclerosis, Eberth), but rather as an impregnation of the tissue

[1] See his valuable paper on Amyloid Degeneration of the Conjunctiva, in vol. xi., 171, of these ARCHIVES.

[2] Peculiar Products with Amyloid Reaction in Mycotic Keratitis. Transact. Vienna Acad. of Sciences, vol. lxxvi., session of July 19, 1877.

with amyloid substance (as according to Virchow's comparison, lime salts are deposited), or as a gradual conversion of preëxisting tissue constituents.

EXPLANATION OF THE FIGURES ON PLATES III. AND IV.

Fig. 1.—Survey picture. Alum-carmine staining. Magnified 52 x. Amyloid deposits in cornea.

a. Amyloid in corneal lamellæ.

*a*1. Amyloid in subepithelial new-formed connective-tissue layer.

*a*2. Amyloid in epithelial layer.

b. Epithelium.

*b*1. Concentric epithelial globules.

c. New-formed connective tissue.

d. Bowman's membrane.

e. Iris.

f. New-formed vessels in cornea.

g. Corneal lamellæ.

Fig. 2.—250 x. Amyloid in corneal lamellæ, separated from Bowman's membrane by subepithelial, new-formed connective tissue, pervaded by capillaries. Lettering as above.

Fig. 3.—185 x. Amyloid in corneal lamellæ. A piece of Bowman's membrane preserved. Subepithelial layer fibrous and cellular.

Fig. 4.—320 x. Penetration of amyloid through Bowman's membrane into subepithelial tissue and partially also into epithelium.

h,*h*. Places of perforation.

i. Artificial fissure.

Fig. 5.—195 x. Amyloid, accumulated chiefly in the homogeneous subepithelial layer, infiltrating in finely divided particles into the corneal lamellæ below, and penetrating as heavier masses into the epithelium above.

Fig. 6.—700 x. (Zeiss, oil immersion $\frac{1}{12}$, eye piece 3) corresponds to the place *k* in Fig. 5. Fine division of amyloid granules in corneal lamellæ; toward the epithelium the size and number of the amyloid granules increase. At *l* a corneal lamella broadened by a larger amyloid globule.

ON CO-EXCITATION IN THE REGIONS OF HOMONYMOUS VISUAL FIELDS.

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Abridged and translated by H. KNAPP.

(*With six lithographic plates, v.–x.*)

A CASE of hysteria masculina, which Prof. Lichtheim requested me to examine perimetrically, drew my attention to the results of retinal fatigue. In the literature a paper by Förster, "On the Measurement of the Visual Field" [V F],[1] and another by Wilbrand[1] on Neurasthenic Asthenopia,[2] have been of particular value to me.

The patient of Prof. Lichtheim was a man of twenty-five years, weakly and hypochondriac, with hereditary neurotic tendency. He suffered from headache, dizziness, drowsiness, spasms in his stomach and legs, pain in his back, convulsive attacks, etc. He is readily hypnotized, paræsthetic, but not cataleptic. M 5–6 D. Ophthalmoscopic condition, color and light sense normal. The first examination showed an almost normal V F in his right (fig. 1, pl. v.), and a concentric contraction to about 5° in his left eye (fig. 2). The next day, after he had read and written for an hour, V F was contracted to 10° R (right eye) and 4° L. The fatigue sustained by the examination, which lasted half an hour, reduced V F to 5° R and 2° L. Then I examined him with spectacles for one quarter of an hour, which reduced V F to 3° R and to the point of fixation L.

In two days, during which patient had worn smoked protectors

[1] Transact. of the Tenth Ophthal. Congress of Heidelberg, 1877, p. 162.
[2] These Arch., vol. xii., p. 428.

and not used his eyes to any work, V F was 5°–10° R, and 5° L. During the next days V F is 3°–5° R, and reduced to the point of fixation L. In spite of this high degree of contraction of his V F, his "orientation" is in no way impeded, and he moves about as freely as if his V F were normal. Similar observations have been made by Wilbrand, Thomsen, and Oppenheim.

In my further investigations I tried to determine the influence of fatigue of one eye on the other, of one half or one part of one retina on the remainder of the same and on the other eye, since the fact that the eye examined after the other always showed a greater contraction of V F, suggested the supposition that the *fatigue did not tell on the retina, but on the occipital lobes.*

Case 2.—Mrs. F., forty-seven years, anæmic, weak, hypochondriac, suffering from neurasthenia. S R $\frac{1}{10}$, L $\frac{1}{2}$, odd atrophic. The V F F varied considerably on different days. In the left eye examined five times in succession during forty-five minutes, the V F became narrower each time, as is represented in fig. 4, till it was reduced to a circle of 5° radius (fig. 3), in which, as in the former fields, all the colors were distinguished.

Twelve days later its meridians were examined in regular succession, according to Wilbrand, eight times within twenty minutes. Each examination took 2.5 minutes, which is possible with Scherk's perimeter only, and reduced the V F by about 2°, as is represented in fig. 6, plate vi.

The results of these examinations teach two things: (1) the V F of the fatigued eye contracts regularly in each further examination by an equal quota (2°), *i. e.*, in arithmetical, not geometrical progression. (2) The other eye fatigues in the same manner as the one directly affected. This latter fact is indubitable proof that the fatigue does not take place in the retina, but in the occipital lobes. In the cortex of the latter the fatigue of the crossed fascicle is transmitted, quasi by irradiation, to the lateral fascicle, and *vice versa.*

I now fatigued only one, the nasal, half of each eye (figs. 7 and 8), and in the left made eight successive examinations. Each showed a contraction of about 2½° over the preceding one, as seen in fig. 8. Immediately after the last experiment of fatigue in the

temporal half of the V F I examined the nasal half of the V F and found its limits normal.

The examination of the V F of the other (R) eye showed the nasal half, which corresponded to the temporal half of the left, contracted in the same degree, *i. e.*, to about 8°. The other (temporal) half was unchanged.

This result again strengthens our previous conclusion *that fatigue does not affect the retina, but the occipital lobe;* in other words, we have not to deal with a retinal but a cortical process.

Similar examinations of one *quadrant* of each eye of our, now rested, first patient yielded like results, as is seen in figures 9 and 10.

Continued investigations furnished diverse, in part surprising results, but all are intelligible and afford an insight into the condition of both occipital lobes at the time.

Simultaneous and homonymous excitation of one eye showed the following conditions in the other:

A. The degree of excitation remaining the same for all meridians:

1. The fatigue was concentric and equal in both. (Case 2, figs. 5 and 6; case 3, a neurasthenic man of twenty-three years. Four successive examinations reduced V F gradually by 18°; in the other eye the same by transmission.)

2. Only one half of the V F of one eye, and by transmission the corresponding half of the other eye, can be fatigued, showing:

(*a*) A contraction of V F equal in both. (Case 4, neurasthenia; case 5, hysteria; figs. 11 and 12, pl. vii.; case 6, hysteria.)

(*b*) The contraction of the homonymous half of the V F of the second eye resembles that of the first, but is less in degree. (Case 7, neurasthenia; contraction in first, 20°; in second, 10°.)

3. Regular concentric contraction in one eye induced contraction only in one half of the V F of the other. (Case 8, hysteria, figs. 13 and 14.)

4. While one half of the V F contracts, the other half

dilates in the same degree; the same condition is induced in the homonymous halves of the other eye. The same irritation diminished the function in one half of V F, while in the other it acts as an excitant. (Case 1, hysteria, figs. 15 and 16.)

5. The examination at first dilates the V F, but if continued, restores the former limits, without further contraction. (Case 9, neurasthenia. The dilatation was 3°.)

B. The degree of the co-excitation is uniformly increasing or decreasing in the adjacent meridians of one half of V F, but remains unchanged in each single meridian.

This category is represented by two cases only.

The co-excitation was a fatigue in both, the V F was contracted. (Case 10, hysteria; figs. 17 and 18, superior hemiopia; case 11, hysteria; the examination induced an hysteric seizure.)

It could easily be supposed that the fatigue of one half of the V F would affect the homonymous half of the other in a similar way. Experiments have verified this supposition. (Case 2, figs. 7 and 8; case 4; case 12, hysteria; case 13, hysteria, figs. 23 and 24; with anomalous color-fields, figs. 19 and 20, 21 and 22, 25 and 26, 27 and 28, found in the course of 12 days. Case 14, neurotic, apoplectic surprise.)

In a number of healthy persons, examined in the same way for the sake of comparison, the limits of the V F did not change.

In all cases in which a concentric limitation of the field existed, it depended on a pure disturbance of the cerebral functions or a disturbance complicated with an organic lesion. In all these cases a further limitation could be produced by continued examinations of the V F.

Figs. 29 and 30, plate x., represent the contractions of the V F F obtained, when first the outer limit only is determined, but then the extent of each meridian is measured by carrying the visual object from one side of the meridian to the other. A limitation is noticed at the end where the visual object is carried last.

Reviewing the preceding statements we arrive at the following conclusions:

1. The so-called fatigue, and the anomalous excitability, of the retina must be regarded as a fatigue of the cortex of the occipital lobes. It is found :

(*a*) In all conditions heretofore erroneously designated as anæsthesia or hyperæsthesia of the retina. It may occur in purely functional affections (hysteria, hypochondria, neurasthenia), and in organic lesions of the central nervous system.

(*b*) In transient psychical alterations (also in healthy persons).

2. The limitation of the periphery of a sector of the V F has no influence on the periphery of an adjacent sector or any other part of the same V F.

3. The fatigue of the visual centre produced by the examination in one eye is transmitted in a definite manner to the fibres for the other retina that govern homonymous parts in the visual fields.

4. The limitation of homonymous retinal fields is incompatible with Wernicke's views on the projection of the visual centre, according to which there is in each occipital lobe a demarcation line of the homonymous halves of the retinæ corresponding to the vertical lines of separation of the two visual fields.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1886.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

440. Eversbusch. German ophthalmology at the close of the eighteenth and the beginning of the nineteenth century. *Münchener med. Wochenschr.*, 1886, No. 27.

Eversbusch (440) mentions particularly J. A. Schmidt among the oculists prominent at the end of the last century. Schmidt has given a very accurate description of iritis and of the development of secondary cataract. Carl August Graefe almost recognized the true theory of accommodation and presbyopia.

441. Snell. Records and investigations into sixteen families of blind parents. *Brit. Med. Jour.*, Aug. 7, 1886.

442. Snell. Reports of the causes of blindnsss in 111 pupils in the Sheffield Institution for the Blind. *Brit. Med. Jour.*, Feb. 27, 1886.

Snell (441) records an investigation into sixteen families of

blind parents. All these children had good sight. There were twenty-seven of them, which he considers shows that the marriages among the blind are unfruitful. MAXWELL.

SNELL (442) found the percentage of the causes of blindness as follows :

Blennorrhœa neonatorum	34.2 %
Other conjunctival affections	7.9 "
Sympathetic ophthalmia	9.0 "
Accidents to both eyes	2.7 "
Small-pox	4.5 "
Fevers	3.6 "
Congenital cataract	4.5 "
Congenital blindness (various causes)	6.3 "
Atrophy of optic nerve	18.0 "
Corneal opacity	5.4 "
Iridochoroiditis	0.9 "
Retinitis pigmentosa	0.9 "
Miscellaneous	2.1 "

b.—STATISTICAL PAPERS.

443. ALEXANDER. Eighth annual report of the Ophthalmic Hospital at Aix-la-Chapelle, 1887.

444. BADAL. Recherches statistiques sur les manifestations oculaires de la syphilis. *Arch. d'ophth.*, No. 4, 1886.

445. BOSTON. Sixty-first annual report of the Charitable Eye and Ear Infirmary for the year 1886.

446. EMERSON. Statistics illustrating the etiology of paralysis of the ocular muscles. *N. Y. Med. Jour.*, May, 1886.

447. NEW YORK OPHTHALMIC AND AURAL INSTITUTE. Seventeenth annual report for the year Oct., 1885, to Oct., 1886. New York.

448. PHILADELPHIA. Twenty-sixth annual report of the German Hospital of the city of Philadelphia for 1885.

449. SIMI. Ospedali riuniti di Lucca (servizio ottalmico). *Boll. d'ocul.*, vol. viii., 11 and 12.

ALEXANDER (443) treated 1,959 new patients and performed 276 operations, among them 13 extractions of senile cataracts.

BADAL (444) found affections of the muscles in 144 cases, being 22 % of the whole number of cases of syphilis of the eyes. In 107 of these 144 the oculomotor nerve was affected, in 28 the superior oblique, in 4 the abducens, in 2 the fifth, in 2 the facial nerve. In 76 there were complications as follows :

Amblyopia, atrophy	26 cases	= 20 %
Ataxia	18 "	= 13 "
Iritis, retinitis, choroiditis	13 "	= 10 "
Paralysis of other nerves	10 "	= 7 "
Hemiplegia	4 "	= 3 "
Deafness	4 "	= 3 "
Keratitis	1 "	= 0.8 "

Paralysis of the muscles occurs most frequently in the first and in the tenth year after infection. The optic nerve was affected in 22 %, in 82 cases in form of atrophy, in 38 of neuritis, in 16 of neuro-retinitis, and in 3 of choked disc. Atrophy occurs oftenest in the eleventh year after infection; it was complicated as follows:

Ataxia	in 28 %
Paralysis of oculomotor nerve	" 25 "
Disturbance of intellect and progressive paralysis	" 16 "
Iritis, choroiditis, retinitis	" 16 "
Paralysis of superior oblique	" 11 "
Myosis	" 11 "
Hemiplegia	" 10 "
Deafness	" 7 "
Various tertiary symptoms	" 5 "
Cataract	" 2 "
Epilepsy	" 2 "
Paralysis of fifth nerve	" 1 "
" " abducens	" 1 "

EMERSON (446) presents statistics of 64 cases of paralysis of the ocular muscles; in 36 the oculomotor nerve was affected, in 23 the abducens, in 3 the superior oblique; ophthalmoplegia externa was found in 2 cases. In 28 % syphilis proved to be the cause. In 61 cases only one eye was affected; in 3 both. The ratio of males to females was 44:20.

In the MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY (445) 8,558 eye-patients were treated. One fourth had affections of the conjunctiva. Extractions according to Graefe, 86. Exact statistics of 108 cases of extractions are given, to which we would call special attention.

In the NEW YORK OPHTHALMIC AND AURAL INSTITUTE (447) 5,346 eye-patients were treated, one fourth of whom had affections of the conjunctiva; the number of diseases of the cornea was almost as great. Number of operations, 563; among them 52 extractions according to Graefe; in 49 the result was good; in one moderate; two were failures. BURNETT.

The OPHTHALMIC DIVISION OF THE GERMAN HOSPITAL AT PHILADELPHIA (448) was under the charge of Dr. C. S. TURNBULL. Number of cases, 617 ; 75 operations, of which two were extractions of cataract ; 7 enucleations, 6 tenotomies, 11 iridectomies. BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND THERAPEUTICS.

450. HOWE. On transplantation of the eye of the rabbit. *New York State Med. Assoc.*, 1886. Report on six transplantations, all of the eyes sloughing after a few days.

451. KNAPP, H. Remarks on pyogenic organisms with demonstrations and experiments. *Trans. Amer. Ophth. Soc.*, 1886.

452. ROLLAND. De la panophthalmie. Nouveau procédé d'exstirpation de l'œil dans cette affection. Paris, 1886.

453. SCHIFF. Sur les causes des troubles dans la nutrition de l'œil qui surviennent après la section des nerfs de la cinquième paire cérébrale. *Arch. des sci. phys. et nat.*, Nov., 1886. He opposes the theory according to which the neuroparalytic disturbances of the eye are due to the loss of sensibility.

454. SCHWEIGGER. On enucleation and exenteration. *Berliner med. Gesellsch.*, Nov. 3, 1886.

KNAPP (451) demonstrated to the society the effects of operating on the eyes of rabbits with strict antiseptic precautions, and with instruments contaminated with staphylococcus pyogenes aureus. In every case in which the operation was done with the contaminated instruments destructive inflammation ensued. The other eyes were in good condition except one which had become accidentally inoculated. BURNETT.

ROLLAND (452) publishes another paper (*cfr. Rev. d'ophth.*, April, 1886, p. 213), in which he recommends enucleation in panophthalmitis and opposes exenteration as advocated by Graefe. He does not perform enucleation, however, when the patient notices flashes of light or similar symptoms, making it probable that the septic micro-organisms have entered the lymph-sheaths of the optic nerve ; neither does he operate when there are cerebral symptoms. Rolland performed enucleation in 70 cases of panophthalmitis without accident ; 10 others he has operated lately according to a method devised by himself : after the conjunctival incision the eye is cut open in the horizontal diameter from one

end to the other, the interior is washed out with antiseptic solutions until the sclera is laid bare, and then the operation is completed. Finally the socket is washed out with antiseptic solutions. Rolland therefore performs exactly what other oculists would try to avoid,—the opening of the panophthalmitic globe.

MARCKWORT.

SCHWEIGGER (454) advocates exenteration in laceration of the cornea and sclera, and in minor injuries attended with purulent choroiditis. Resection of the optic nerve is indicated in sympathetic ophthalmia. In cases of malignant intraocular tumors enucleation should be performed.

b.—GENERAL DIAGNOSIS.

455. JACKSON, EDWARD. The best form and practical value of the shadow-test in the measurement of refraction. *Journ. Amer. Med. Assoc.*, Sept. 4, 1886.

JACKSON (455) has great confidence in the accuracy of the method when properly used. He uses by preference a plane mirror 1½ in. in diameter, and a small and brilliant point of light.

BURNETT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

456. DENNETT, W. S. Dyer's perimeter. *Trans. Amer. Ophth. Soc.*, 1886.

457. DIBBLE, L. S. A new perimeter. *Jour. Amer. Med. Assoc.*, Nov., 20, 1886.

458. HAY, G. On the combination of two cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

459. HIRSCHBERG. An aseptic bandage. *Centralbl. f. prakt. Augenhk.*, 1886, p. 269.

460. JACKSON, EDW. Lens-series for the refraction ophthalmoscope. *Trans. Amer. Ophth. Soc.*, 1886.

461. KROLL. Stereoscopic pictures. Hamburg and Leipzig, 1886.

462. RANDALL, B. A. A modified Loring ophthalmoscope, with a disc of cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

463. WICHERKIEWICZ. A suitable permanent bandage for cataract operations. *Centralbl. f. prakt. Augenhk.*, Dec., 1886.

DENNETT (456) has modified and improved the original instrument. It is now made self-registering. BURNETT.

DIBBLE (457) employs no new principle. He uses a quadrant only, but it is so set and arranged as to be easily manipulated ; it weighs only twelve and a half pounds. BURNETT.

HAY (458) presents a mathematical solution of the question, for the essential parts of which he acknowledges his indebtedness to Prof. Oliver, of Cornell University. While in no important respect superior to Dr. Jackson's solution, presented at the same meeting, it is worked out in a more elegant matter.

BURNETT.

HIRSCHBERG (459) applies over the ordinary aseptic bandage a roller made of prepared gauze, which has lain in a sublimate solution 1 : 1,000. When applied moist it soon becomes hard, and remains in position 2–3 days.

According to JACKSON (460) the most useful and convenient series of lenses for the refraction ophthalmoscope is the following : Convex : 0.5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 4.5, 5., 5.5, 6., 7., 8., 9., 10., 11., 12., 15., 20. Concave : 0.5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 4.5, 5., 5.5, 6., 7., 8., 9., 10., 12., 15., 20., 30., 50. BURNETT.

KROLL (461) has designed 25 stereoscopic plates, which are to be used not only for suppressing incipient strabismus but also after tenotomy. The pictures are excellent, and the reviewer has used them with the greatest advantage. They are especially useful in the after-treatment of strabismus, making the effect of the operation lasting, and preventing the subsequent development of secondary deviation. They are also very convenient for exposing simulants. The pictures are deserving of general recognition, but in the second edition the reviewer would suggest an increase in the number of letter-plates. The pictures form an important addition to the equipment of the oculist.

RANDALL (462) has added a disc of cylindrical lenses to the ordinary Loring ophthalmoscope. BURNETT.

WICHERKIEWICZ (463) uses a bandage similar to that described by Hirschberg.

b.—REMEDIES.

464. COGGIN, DAVID. Protracted action of hydrobromate of homatropine in spasm of the accommodation. *Amer. Jour. Ophth.*, July, 1886.

465. CLAIBORNE. J. H. Peroxide of hydrogen as a thera-

peutic agent in diseases of the eye. *N. Y. Med. Jour.*, Sept. 11, 1886.

466. HAYNES, S. Balsam copaiba in gonorrhœal ophthalmia. *Med. Record*, Oct. 9, 1886.

COGGIN (464) found that a drop of a solution (1 : 60) of hydrobromate of homatropine, twice repeated at ten minutes' interval, suspended the power of accommodation for four days.

BURNETT.

CLAIBORNE (465) has made experiments with peroxide of hydrogen in conjunctival and corneal troubles, but has not found sufficient benefit to justify a continuance of its use.

BURNETT.

HAYNES (466) used local application of balsam copaiba in a single case, applied to the brows, lids, and a little inside the lids, after thorough cleansing, three times a day. The patient made a good recovery. Dr. I. Beermann, of Washington, informs me that he used the same remedy some years ago and published his results with it.

BURNETT.

IV.—ANATOMY.

a.—GENERAL ANATOMY.

467. FLEMMING. Chart of the human eye. Brunswick, 1887. Demonstrated before the meeting of naturalists at Berlin, 1886.

468. HAENSELL. La méthode de l'inclusion du globe oculaire dans la paraffine et dans la celloidine. *Bull. de la clin. nat. ophth. de l'hôp. des quinze vingts*, vol. iv., 4.

469. LANDESBERG. Contributions to the knowledge of the congenital anomalies of the eye. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 399.

470. RANDALL, B. ALEX. The underlying conus. *Amer. Jour. Ophth.*, Nov., 1886.

FLEMMING (467) has prepared an excellent drawing of a horizontal section of the right eye on the scale of 30 : 1. The development of the various parts is clearly indicated by special coloring. A few inaccuracies in the nomenclature might be corrected. The chart is certainly very useful.

To obtain uniform hardening of the globe and fixation of the various tissues HAENSELL (468) places it in a solution, containing a few drops of acetic acid, of the following composition : 25 volumes of a watery solution of chromic acid, 10 vols. of a saturated

watery solution of picric acid, 65 vols. of distilled water. If it is desired to harden the retina in particular and keep it in position, 2 vols. of a 1-per-cent. solution of osmic acid must be added. After three or four days the eyeball is taken out, cut in two, washed out in water for several days, and then placed in alcohol or Müller's solution for further hardening. Another method of hardening consists in placing the globe in 40, 60, 80, and 90 per cent. alcohol successively for twenty-four hours at a time. For embedding in celloidin or paraffin, see the continuation.

V. MITTLESTÄDT.

RANDALL (470) presents the history of a case, accompanied with drawings of the "conus nach unten" (the crescent below), as described by Fuchs and Szili. BURNETT.

b.—COMPARATIVE ANATOMY.

471. PRÖBSTING. Contribution to the finer anatomy of the lid and conjunctiva of man and the ape. *Zeitschr. f. vergl. Augenhk.* Wiesbaden, 1886, and Inaug.-Diss., Erlangen, 1886.

472. WÜRDINGER. The comparative anatomy of the ciliary muscles. *Zeitschr. f. vergl. Augenhk.* Wiesbaden, 1886, and Inaug. Diss., Würzburg, 1886.

WÜRDINGER (472) has examined the ciliary muscle in a large number of animals, and found in all of them organic fibres in the ciliary body. The development of the ciliary muscle, *i. e.*, its size in proportion to the size of the animal and eye differs very much, and depends on the mode of living.

c.—CORNEA.

473. SCHÖBL. The blood-vessels of the cornea in the normal and pathological condition. *Centralbl. f. prakt. Angenhk.*, Nov., 1886. This paper was followed by polemics in the December number of 1886 and the January number of 1887.

SCHÖBL (473) has obtained the following results: (1) There is no præcorneal network of blood-vessels in the fœtal eye. (2) Besides the superficial marginal network, there is a second deeper one. (3) The pathological blood-vessels in superficial conjunctival keratitis come from the superficial network; the pathological blood-vessels in deep-seated scleral keratitis come from the deep system. (4) The superficial corneal blood-vessels ramify dendritically, the deeper ones like broom-corn.

d.—REFRACTIVE MEDIA AND NERVOUS APPARATUS.

474. SCHÖN. Zonula and membrana limitans of the vitreous. *Arch. f. Ophth.*, vol. xxxii., 2.

SCHÖN (474) maintains that there are zonula-fibres between the anterior and posterior ones, which are attached close to the æquator of the lens, and radiating like a brush, attach themselves to the capsule. He also maintains the existence of the membrana hyaloidea.

475. DARKEWITSCH. The so-called centres of the optic nerve and their connection with the cortex of the cerebrum. *Arch. f. Anat. u. Phys.*, anat. part, 1886, Nos. 3 and 4.

476. DARKEWITSCH. The pupillary fibres of the optic tractus. *Wratsch*, No. 43.

477. DENTI. Caso singolarissimo di bilaterale congenita mancanza dei vasi retinici con opacita catarattosa bilaterale posteriore pure congenita. *Gaz. med. ital. Lomb.*, vol. xlvi., No. 32, p. 323.

DARKEWITSCH (475) disproves Bechterew's view, and shows that only one centre exists for the fibres of the optic nerve, the upper eminences of the corpus quadrigeminum. A number of fibres come from the glandula pinealis and the ganglion habenulæ, which join the fibres of the optic nerve in the outer corpus geniculatum, and may be considered pupillary fibres. The fibres of the optic nerve do not cross in the corpora quadrigemina in the manner assumed by Charcot. Only the upper corpus quadrigeminum is connected with the cortex by a special bundle of fibres, but not the outer corpus geniculatum and the pulvinar.

MAGNUS.

DARKEWITSCH (476) concludes, from previous and recent experiments on rabbits, that in the glandula pinealis, and in the ventral portion of the commissura cerebri posterior, the fibres are found which transmit the sensation of light from the retina to the nuclei of the oculomotor nerve. He proves his views not only by atrophy experiments, but also by direct destruction.

HIRSCHMANN.

DENTI (477) observed a woman aged twenty-four in whom there were absolutely no retinal blood-vessels visible. Vision was diminished by opacities at the posterior pole of the lens, but the field of vision and color-perception were normal. The author considers the condition congenital, and of course believes that the

retina was nourished by anastomoses with the blood-vessels of the choroid. DANTONE.

V.—PHYSIOLOGY.

a.—GENERAL AND COMPARATIVE PHYSIOLOGY.

478. ANDREWS, J. A. The electric light as an illuminator. *Trans. Am. Ophth. Soc.*, 1886, and *Med. Rec.*, Sept. 4, 1886.

ANDREWS (478) comes to the following conclusions: that the arc-light, when modified by opal or ground-glass shades, is not so objectionable; but gazing at the arc-light not protected for many seconds is attended with great risk. The arc-lamp in its present state is unsuitable and positively harmful, particularly on account of its unsteadiness. The Edison incandescent light he deems the best. BURNETT.

b.—COLOR-PERCEPTION.

479. ALBINI. Della visione indiretta della forme e dei colori. *Giorn. d. r. Accad. di med. di Torino*, vol. xlix., 7 and 8.

480. DENNETT, W. S. Holmgren's and Thomson's worsteds in a new form. *Trans. Amer. Ophth. Soc.*, 1886.

481. FOX, L. W., and GOULD, G. M. The human color-sense considered as the organic response to natural stimuli. *Amer. Jour. Ophth.*, Sept., 1886.

482. FOX, L. W., and GOULD, G. M. On heat considered as the retinal intermediate of light- and color-sensation. *Amer. Journ. Ophth.*, July, 1886.

483. FOX, L. W., and GOULD, G. M. Retinal insensibility to ultra-violet and infra-red rays. *Amer. Journ. Ophth.*, Dec., 1886.

484. OLIVER, C. A. A new series of Berlin wools for the scientific detection of subnormal color-perception. *Trans. Amer. Ophth. Soc.*, 1886.

485. SEWALL, HENRY. A simple method of testing for color-blindness. *Med. News*, Dec. 4, 1886.

ALBINI (479) has measured the refraction and color-perception of the peripheral parts of the retina. He found that the refraction decreases from the point of fixation towards the periphery in a constant and quite regular manner, the diminution sometimes amounting to 4 D at the boundary of the horizontal meridian, to 2 D at the boundary of the vertical meridian. As regards color, three persons were tested for blue, red, and green in the same directions and at the same distances, and it was found in all that by

using convex glasses the field of vision for colors could be enormously and almost evenly extended, so that it nearly reached that of white. The power of the lenses necessary for this increases from blue to red (for blue + 6 to + 9.50 D were required, for red + 7 to + 10.5 D, for green + 9 to + 12 D), is therefore inversely proportional to the extent of the normal field of color-perception. DANTONE.

DENNETT (480) uses worsted spheres in the place of skeins, and each sphere has a numbered tag. There are three empty trays, each lined with one of the three principal test-colors. The balls are to be distributed into the trays according to their colors as they appear to the person examined. BURNETT.

FOX and GOULD (481) attempt to answer, in accordance with the laws of evolution, the questions as to why certain colors are called primary, why the relative amounts of primary colors vary as they do in the normal spectrum, and to explain the differences in the objective or luminous intensities of colors, and to give the reason of the differences in their subjective intensities and qualities. BURNETT.

FOX and GOULD (482) attempt to establish by *a priori* reasoning and some experiments, which it would be impossible to detail in this short abstract, the very close analogy between the sense of sight and the sense of temperature. They also hold the retina to be a receiving and transmuting membrane, and not in any sense a differentiating one. These views are defined from a physical, a physiological, a chromatological, and a psychological standpoint. The inadequacy of the Young-Helmholtz and the Hering theories for the explanation of the phenomena of vision, is pointed out. In a postscript the authors acknowledge that essentially the same views had already been advanced by the Reviewer in 1884. It may be proper to state here that the Reviewer published an abstract of his views in these ARCHIVES in March, 1881.

BURNETT.

FOX and GOULD (483) advance the teleological argument in explanation of the limit of perception of ethereal undulations by the organ of vision, pointing out what they consider disadvantages that would arise if the eye took cognizance of the infra-red and ultra-violet rays. BURNETT.

OLIVER (484) has enlarged and modified Holmgren's method. There are five principal test-skeins, to which he gives the Latin names "viridis," "ruber," "cœruleum," "flavus," and "rosa"; a

series of twenty small pure match-skeins ; and a series of seventy-two small confusion match-skeins. Printed instructions accompany the series, so that it may be used by intelligent laymen.

BURNETT.

SEWALL (485) has modified Holmgren's method in having the worsteds arranged in graded rows of shade on a cardboard, each color being on a separate card and each tint numbered A, B, etc. The person examined is required to point out on the cards the particular shades or tints corresponding to the test-color, as in the Holmgren method. BURNETT.

Sections VI.–X. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

486. ADAMÜCK. The question of school-myopia. *Wjestnik Ophth.*, vol. iii., 6. (Contin. and conclusion.)

487. FROST, A. Ophthalmoplegia interna. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

488. JACKSON, EDW. The equivalence of cylindrical and sphero-cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

489. LORING, E. G. Dioptric, dioptre, dioptrie, or dioptry. *N. Y. Med. Jour.*, July 24, 1886.

The metre-lens: its English name and equivalent. By S. M. BURNETT. *Ibid.*, Aug. 14, 1886.

Dioptric or Dioptry. By E. G. LORING. *Ibid.*, Sept. 25, 1886.

Dioptry or Dioptric. By H. KNAPP. *Ibid.*, Oct. 2, 1886.

The Dioptry Again. By S. M. BURNETT. *Ibid.*, Oct. 2, 1886.

490. MADDOX, E. Investigations on the relations between convergence and accommodation. *Ophth. Rev.*, 1886, vol. iv., 62, p. 341.

491. MARTIN, G. Etude sur les contractions astigmatiques du muscle ciliaire. *Ann. d'ocul.*, vol. xcvi., pp. 82 and 217. (Contin. and conclusion.)

492. NORRIS, W. F. Some remarks on asthenopia and the changes in refraction in adolescent and adult eyes. *Trans. Amer. Ophth. Soc.*, 1886.

493. OLIVER, C. A. A series of metric test-letters and words for determining the amount and range of accommodation. *Trans. Amer. Ophth. Soc.*, 1886.

ADAMÜCK (486) examined every year for nine successive years, the refraction of the same group of scholars of two high schools at Kasan, from the lowest class to the highest. The number of scholars examined was 317. In the lowest class he found nearly the same percentage of the various forms of refraction as in his clinic, namely, hypermetropia 52.6 %, emmetropia 33 %, and myopia 14.2 %. $V < \frac{20}{30}$ was found in 10 % of all cases, oftenest in myopia, most seldom in hypermetropia. None of the children was color-blind. For the details of the tables, which contain the age, vision, refraction, ophthalmoscopic appearance, power of adduction and pupillary distance of every scholar from year to year, as well as the analysis of every case, see the original.

Adamück found that the refraction increased in all eyes, though not in the same degree; in those originally myopic it increased in 90.9 %; in those originally emmetropic in 32 %; in those originally hypermetropic in 51.6 %. The author attributes great influence on the development of myopia to the length of the basal line, although frequently no direct connection between the two could be shown. Congenital disposition is of great importance, and frequently manifests itself in the ophthalmoscopic appearance by greater pigmentation or absence of pigment in shape of a crescent at the edge of the papilla. In progressive myopia the development of shortsightedness precedes that of the crescent.

HIRSCHMANN.

FROST (487) reports a case of paresis of accommodation, which had existed for four months. The pupil reacted. The patient was perfectly well, but the knee-jerk was absent. He was cured with iodide of potassium.

JACKSON (488) shows, in the form of four propositions, that all combinations of cylinders with their axes crossed at right angles or obliquely, are either sphericals or sphero-cylinders, according to the relative power of the two lenses and the angle of crossing of their axes. The method of finding the equivalent of any thus superimposed cylindrical lenses by the construction of a parallelogram is not new we believe, but a restatement of that made by Stokes in the description of his original lens. BURNETT.

The papers of LORING, BURNETT, and KNAPP (489) contain a discussion mainly between Loring and Burnett, as to the English name for the metre-lens and its inch equivalent. Loring uses *dioptric*, and gives it a value of 36 in. (French). Burnett contends that *dioptry* is preferable, being more in accordance with the

derivation of the word, and less confusing, dioptric being also an adjective, and that Americans should use the English inch with which they are supposed to be most familiar, forty of them (approximately) being in one metre. Knapp favors dioptry.

BURNETT.

MARTIN (491) publishes in the *Ann. d'ocul.* the continuation and conclusion of his voluminous paper on the astigmatic contractions of the ciliary muscle, which are intended to correct the corneal astigmatism either entirely or in part. Martin distinguishes between two kinds of contractions : "elastiques" he calls those which disappear when the glass correcting the astigmatism is put before the eye ; "renitentes," those which persist in spite of the correcting glass. While the elastic contractions disappear even under cocaine, the renitent resist this remedy, but yield to atropine. In the Sept.-Oct. number he still upholds the theory that partial contractions of the cilliary muscle of 2.5 D are excessive, but in the Nov.-Dec. number, he recalls this statement, and publishes cases of much greater partial contractions (up to 4.25 D) ; they never, however, manifested themselves, but only on fixation at a distance of 17 *cm.* Partial contractions are found in about one half of all astigmatic eyes, and decrease with age ; they persist for a remarkably long time in nervous individuals and persons suffering with hemicrania. In younger people also these contractions sometimes disappear after enfeebling constitutional diseases, but reappear as the patient becomes stronger. The renitent contractions do not produce any asthenopic symptoms, while the elastic do. The latter therefore must be corrected, but not the former. Corneal astigmatism must therefore be corrected only to the extent revealed by the subjective examination without instillation of atropine, and not that portion of it which becomes apparent after the use of atropine. Sometimes, but rarely, a total astigmatism is found greater than the corneal astigmatism ; in these cases asymmetry of the lens increases the homonymous asymmetry of the cornea. An over-correction of corneal astigmatism by too energetic contractions of the ciliary muscle rarely occurs, but the existence of such cases is certain. Martin found it among three thousand persons, the refraction and ophthalmoscopic appearance of whose eyes he closly examined forty-five times. MARCKWORT.

NORRIS (492) believes that that the strain of asthenopia causes congestion, leading to the distention of the tissues, not only of the

posterior but also of the anterior portion of the eyeball, and of the lids, and that the strain should be relieved by the use of proper glasses, and that the refraction should be measured under a strong mydriatic. BURNETT.

OLIVER'S (493) card is a reduction of the scale, with some modification as to the arrangement of the words which he presented at the last meeting of the society. The words are composed of black letters, the lines of which subtend the accepted smallest visual angle at the distance for which they are numbered. It is very conveniently mounted, and is made by Queen & Co., Philadelphia. BURNETT.

VII.—LIDS.

494. DE BECK, DAVID. Hard chancre of the eyelids and conjunctiva. Contributions from the ophthalmic clinic of the Med. Coll. of Ohio, No. 3, July, 1886.

495. GREEN, JOHN. Operative treatment of entropium. *Amer. Journ. Ophth.*, Dec. 1886.

496. MITTENDORF, W. F. Two epidemics of molluscum contagiosum. *Trans. Amer. Ophth. Soc.*, 1889.

DE BECK (494) gives the history in full of a single case of his own and presents a very full and complete résumé of all the hitherto published cases, properly tabulated together with nine unpublished cases. The monograph is illustrated with four very good chromo-lithographs and two wood-cuts, and is probably the most extensive record of the subject to date. BURNETT.

GREEN'S (495) article is a continuation of one begun in the first volume (1883) of the *Journ. of Ophth.*, in which he gives a description of his entropium operation founded upon the procedure of the ancients as described by Celsus, Ætius, and Paulus Æginata. Its essential features are the under incision of the conjunctiva and tarsus and a turning forward of the loosened tissue, containing the cilia, by means of sutures, combined or not with an excision of a part of the lid integument. The paper contains abstracts of the original Latin and Greek, not easily accessible to the general reader. BURNETT.

MITTENDORF (496) found that in two separate institutions for the care of children, after the admission of one child having the tumors on the lids, a large number were affected in the same manner in the course of a few months. The best plan of treatment was found to be excision with the scissors and cauterization of the base with the arg. nitr. stick. BURNETT.

VIII.—MUSCLES AND NERVES.

497. BLANC, E. Le nerf moteur oculaire commun et ses paralysies. Paris, 1886, A. Dalahaye.

498. BRAILEY, W. Rapidly occurring blindness and complete ophthalmoplegia on one side, hysterical. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

499. CLAIBORNE, J. H. Advancement of Tenon's capsule. *Med. Rec.*, Oct. 2, 1886.

500. COUPLAND, SIDNEY. Ophthalmoplegia dependent upon thrombosis of the cavernous sinuses. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

501. FEATHERSTONEHAUGH, THOS. A case of insufficiency of the external recti muscles. *Amer. Journ. Ophth.*, Nov., 1886.

502. GALLENGA. Della diplopia in certe forme di strabismo interno. *Rassegna di sci. med.*, vol. i., 9.

503. HINDE, ALFR. A study of herpes zoster frontalis seu ophthalmicus. *N. Y. Med. Record*, Sept. 11, 1886.

504. KNAPP, H. Advancement of Tenon's capsule in strabismus. *Trans. Amer. Ophth. Soc.*, 1886.

505. KOLLOCK, C. W. Partial paralysis of oculomotor nerve. *Jour. Amer. Med. Assoc.*, Sept. 18, 1886.

506. PROUT, J. S. Badal's operation, or laceration of the infratrochlear nerve for the relief of glaucoma, etc., with cases. *Am. Jour. Ophth.*, July, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

507. STANDISH, MYLES. A case of alcoholic paralysis. *Boston Med. and Surg. Jour.*, April 22, 1886.

508. STEVENS, G. T. A system of terms relating to conditions of the ocular muscles known as "insufficiencies." *N. Y. Med. Jour.*, Dec. 4, 1886.

509. THEOBALD, SAMUEL. The amblyopia of squinting eyes. *Med. News*, Sept. 4, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

510. WEBSTER, D. A case of successful laceration of the infratrochlear nerve—Badal's operation. *Amer. Jour. Ophth.*, July, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

BLANC (497) first gives an anatomical description of the oculomotor nerve, its origin, its cerebral and orbital course; next he treats of its normal functions, and then discusses the paralyses. He divides them into (1) rheumatic and reflex; (2) paralyses due

to changes in the blood, among which he classes those due to lead-poisoning, to poisoning with carbonic acid, sausages, the diphtheritic, syphilitic, diabetic, uræmic, and gouty paralysis. In the third group he ranges the paralyses of central, spinal, and traumatic origin. In the remaining chapters Blanc discusses the symptoms of paralysis of the oculo-motor nerve, describes complete and partial cases, the course, prognosis, and treatment.

Brailey's (498) patient became totally blind in one eye in the course of three months. It was completely immovable, the pupil did not react, and there was ptosis. She was put under mixed treatment, whereupon perception of light and slight mobility slowly returned. The ophthalmoscopic appearance was normal. There were no signs of syphilis, but from the history of the case a psychosis was not improbable, neither could hysteria be excluded.

Claiborne (499) reports a successful case of capsular advancement done according to the method of de Wecker. Burnett.

Coupland (500) observed in an unmarried woman, aged forty-five, the development in both eyes of proptosis and ophthalmoplegia externa, and in the left of ophthalmoplegia interna also. Other cerebral symptoms then manifested themselves, and the patient died. The autopsy revealed meningitis basilaris and thrombosis of the cavernous sinus.

Featherstonehaugh's (501) patient, a young man aged twenty-four, had an insufficiency of the external recti muscles of 17°. It was relieved by tenotomy of the interni; the power of convergence was very much increased, probably from gymnastic exercise. Burnett.

Gallenga (502) describes six cases of convergent strabismus in which there was at the same time incongruity of the retinæ. Accurate and repeated ophthalmometric measurements revealed marked but constant differences in the size of the squint angle and of the angle of the same eye, due to the fact that sometimes the eye fixed with the macula lutea, sometimes with another centre of vision farther inward. Diplopia occurred frequently or could be easily produced. Three of the patients were brothers and sister and had three others who also squinted, but did not possess the second centre of fixation. Dantone.

Hinde (503) believes, from a study of one case and a large amount of literature bearing on the subject, that the phenomena of herpes zoster frontalis are due to neuralgic disease of the ophthalmic branch of the fifth pair, due to asthenia of the nerve tis-

sues and in the large majority of cases of central origin. As to treatment, he regards eserine as the remedy *par excellence.*

BURNETT.

KNAPP (504) has done the operation ten times, differing, however, somewhat from the plan originally devised by de Wecker. He advances the whole of the anterior portion of the vertically folded muscle and passes a suture through it intending to get a plastic inflammation which shall result in a shortening and contraction of the parts. It is really an advancement of the muscle without detaching it. The results have been very satisfactory.

BURNETT.

KOLLOCK (505) reports the case of a colored woman of thirty, who two months after confinement was taken sick with pains in the head and was unconscious for a month. On recovery the right lid could not be raised. In four months it regained its power, but there still remained retraction of the globe, and paralysis of the superior and inferior recti and inferior oblique and partial paralysis of the ciliary muscle and iris. This condition remains the same. BURNETT.

PROUT (506) performed the operation of Badal nine times on five patients, and from the results obtained in these cases, he thinks the operation deserving of trial, especially in cases unfit for operations on the eyeball. It cannot make matters worse as to the eyes, and the relief from pain, even if temporary, is worth procuring at the cost of so slight an operation. BURNETT.

STEVENS (508) offers the following nomenclature : *Generic terms:* Orthophoria, a tending of the visual lines to parallelism ; heterophoria, a tending of these lines some other way. *Specific terms :* Esophoria, a tending of the visual lines inward ; exophoria, a tending of the visual lines outward ; hyperphoria (right or left), a tending of the right or left visual line in a direction above its fellow. *Compound terms :* Hyperesophoria, a tending upward and inward ; hyperexophoria, a tending upward and outward.

BURNETT.

THEOBALD (509) is of the opinion that the arguments against the suppression theory are not as yet sufficient to justify us in abandoning attempts to improve the defective eye in squint by practice and by prompt surgical interference. BURNETT.

In WEBSTER'S (510) case the eye was glaucomatous and painful, as a result of disorganization, due to ophthalmia neonatorum. The operation seems to have done positive and permanent good.

BURNETT.

IX.—ORBIT AND NEIGHBORING CAVITIES.

511. BOBONE. Sur le traitement opératoire de la maladie de Basedow. *Ann. d'ocul.*, vol. xcvi., p. 260.

512. CASTALDI. Epithelioma della regione sottorbitaria e del sopraciglio. Asportazione. Guarigione completa e permanente. Incurabile Napoli. Maggio-Giugno, 1886.

513. CRITCHETT and JULER. Orbital tumor. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

514. DEMPSEY, A. Case of orbital aneurysm. *Brit. Med. Jour.*, 1886, p. 541. Bibliography.

515. GUAITA. Voluminosa esostosi dura dell' orbita demolita conservando il globo oculare. *Ann. di ottalm.*, vol. xv., Nos. 2 and 3, p. 205.

516. MORELLI. Cisti idatidea della cavità orbitaria sinistra. Enucleazione dell' occhio. Guarigione. *Riv. clin. e terapeut.*, vol. viii., 6, p. 281.

517. RICHET. Sarcome de l'orbite. Opération. *France méd.*, 1886, No. 108, p. 1289.

518. ROLLAND. De l' articulation orbito-oculaire ; ses traumatismes, plaies, luxations, enucléations traumatiques. *Rec. d'ophth.*, 1886, No. 11, p. 657.

519. THOMPSON, J. H. An obscure case of exophthalmus. *Jour. Amer. Med. Assoc.*, Oct. 30, 1886.

520. WHITE, W. H. On the prognosis of secondary symptoms and conditions of exophthalmic goitre. *Brit. Med. Jour.*, July, 1886, p. 151.

BOBONE (511) discusses the cure of Basedow's disease by treating the hypertrophic rhinitis, which existed at the same time, with the galvano-cautery. MARCKWORT.

CASTALDI (512) has successfully extirpated from the orbit two severe cases of epithelioma, which were considered incurable, and compares at length the histological condition and difference in the arrangement of the tissues of the two tumors. DANTONE.

CRITCHETT and JULER'S (513) case was that of a young woman aged twenty-one, whose left eye had become prominent without diplopia. The cause was found in a tumor in the zygomatic region, which disappeared after using iodine of potassium.

GUAITA (515) removed an exostosis of 25 cub. *cm*, which had existed for fifteen years, from the orbit, and succeeded in preserv-

ing the globe. The tumor enclosed nearly the whole orbit like a shell, and projected at several points beyond the orbital margin. It sprang with a broad base from the ethmoid bone, and surrounded and dislocated the globe and other contents of the orbit. The optic nerve had suffered most from the pressure, and the eye had been blind for five years from atrophy of the nerve. The first symptom of disease was said to have been marked swelling of the lids, which was observed after sneezing violently. The author explains this by assuming that the lamina papyracea of the ethmoid bone was broken by the violent sneezing, and that the callus which then formed developed to an abnormal extent, filling the whole orbit. The tumor was very compact, but not of ivory hardness, and bore the impressions of the ocular muscles and the optic nerve. DANTONE.

RICHET (517) observed in a young man, aged twenty-four, a rapidly growing tumor in the region of the right eyebrow. It was removed and proved to be a sarcoma of the glandula lacrymalis superior et inferior, which had remained confined to these glands. MARCKWORT.

ROLLAND (518) reports another case of traumatic enucleation of the eye. A man was struck with an umbrella in the hands of another with such force in the region of the inner canthus that the eye was completely enucleated and hung on the cheek by a few shreds. Tenon's capsule was not injured. The remaining attachments were severed with one stroke of the scissors, and the recovery was as rapid as after a regular operation. Rolland discusses the mechanical conditions of such an injury, basing his remarks on experiments on dead pigs and chloroformed rabbits. MARCKWORT.

THOMPSON'S (519) case was that of a boy aged five, in whom, without any injury or serious illness of any kind, a gradually increasing exophthalmus of the right side developed, preceded by some paroxysmal pains on that side of the head. The eye protruded half an inch forward and slightly outward. No evidence of periostitis or cellulitis or tumor. In a few days, without other than external medication, the eye returned to its normal position. Vision was good and there was no papillitis. BURNETT.

WHITE (520) reports on twelve cases of morbus Basedowii, seven of whom died. Where recovery takes place, the symptoms do not disappear until five years after the beginning of the disease

As regards treatment, digitalis was of no benefit, belladonna of only slight, but the constant current proved useful.

MAXWELL.

X.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

521. ADAMÜCK. Remarks induced by the polemics of Reich and Iskersky on trachoma. *Wratsch*, 1886, No. 50.

522. ANDREWS, J. A. Contagious eye-disease. *N. Y. Med. Jour.*, Sept. 25, 1886.

523. DE CHRISTMAS-DIRCKINCK-HOLMFELD. La jéquiritine et ses effets. *Bull. de la clin. nat. ophth.*, vol. iv., No. 4, p. 157.

524. DICKINSON, WM. Pemphigus conjunctivæ. *Jour. Am. Med. Ass'n*, Nov. 20, 1886.

525. FANO. Polype du répli sémilunaire de la conjonctive. *Jour. d'ocul. et de chir.*, 1886, p. 221.

526. FONTAN. La tuberculose de la conjonctive et de la cornée. *Rec. d'ophth.*, 1886, No. 10, p. 577.

527. FRYER, B. E. The use of hot water in some of the conjunctival and corneal inflammations. *Trans. Am. Ophth. Soc.*, 1886.

528. GRASSELLI, G. Il jequirity nella cura della ottalmia granulo-tracomatosa. *Boll. d'ocul.*, vol. viii., No. 12, p. 390.

529. KAZAUROW. Observations on the actions of iodol in eye-diseases. *Wratsch*, 1886, No. 44.

530. MINOR, J. L. Boric acid powder in the treatment of granular lids. *N. Y. Med. Journ.*, July 31, 1886.

531. MITTENDORF, W. F. Conjunctival affections. *Med. and Surg. Rep.*, 1886, No. 24.

532. SCHTSCHEPKIN, J. The treatment of trachoma. *Wratsch*, 1886, No. 42.

533. SMITH, EUGENE. Transplantation of conjunctiva from the rabbit. *Journ. Amer. Med. Assoc.*, Sept. 25, 1886.

534. WEEKS, J. E. Ophthalmia neonatorum—its cause, prevention, and treatment. *N. Y. Med. Rec.*, July 24, 1886.

ADAMÜCK (521) calls attention to the fact that not every unevenness of the conjunctiva must be called trachoma. He proposes the term "folliculosis conjunctivæ" for the cases of follicular swelling, which is found especially in young scrofulous persons in the temporal portion of the lower fornix, generally does

not affect the cornea, and may disappear of its own accord; it must be strictly kept apart from trachoma, into which it can only develop by specific infection. The only prophylactic against trachoma consists in strictly avoiding every possibility of infection. Large barracks are of no avail. The author prefers sulphate of copper to all other remedies, but it must be used carefully. Sanitary stations for trachoma patients are of benefit only when they are not less that 1,500 or 2,000 feet above the sea level.

HIRSCHMANN.

ANDREWS' (522) paper treats of trachoma and blennorrhœa neonatorum, and especially of the remedies and prophylactic measures. BURNETT.

J. DE CHRISTMAS-DIRCKINCK-HOLMFELD (523) comes to the same conclusions from his experiments as Venneman and Bruylants, that the jequirity-ophthalmia is not an infectious disease, but is due to the chemical action of jequiritin. He did not find any bacilli either in the pus or in the inflamed tissues, nor could any be cultivated. No transmission of the conjunctivitis from one eye to another through the secretion was observed, The most active jequirity-ophthalmia is produced by macerating the pulverized beans in glycerine. Subcutaneous injection of the ordinary as well as of a sterilized maceration produced in warm-blooded animals inflammation of the subcutaneous tissue, of the serous membranes, and even death. Neither the blood nor the products of inflammation of the poisoned animals possessed any infectious properties. v. MITTELSTÄDT.

DICKINSON (524) reports a case of pemphigus conjunctivæ, which, however, disappeared before the final issue of the disease. The blebs first made their appearance in the integument of the lids, later on the conjunctiva near the cornea. BURNETT.

FANO (525) removed a polypus 1 *cm* long from the plica semilunaris. The microscopical examination revealed some pigment cells in the tissue, and a small quantity of cartilaginous tissue in the centre of the tumor. MARCKWORT.

FONTAN (526) reports two more cases of tuberculosis of the conjunctiva and cornea. He also discusses at length the literature of the subject. According to Fontan, the best local treatment consists in scraping out the nodules and dusting iodoform plentifully upon them. When the tuberculosis is confined to the conjunctiva and cornea, the eye should not be sacrificed.

MARCKWORT.

FRYER (527) uses water from 140° F. up to near the boiling point, appplied as fomentations, in all forms of purulent ophthalmia and in corneal abscess and ulcers. BURNETT.

GRASSELLI (528) breaks one lance more for jequirity, and recommends it in the second stage of trachoma, *i. e.*, neither in the acute stage nor in the atrophic condition of the conjunctiva. Jequirity is contra-indicated when there is no pannus or when there are corneal ulcers. DANTONE.

KAZAUROW (529) concludes from sixty observations on healthy (five cases) and diseased eyes, that iodol cannot be awarded a prominent place in ophthalmology. The healthy eye is greatly irritated by the insufflation of iodol. Catarrhal affections are made very much worse. For phlyctenulæ, however, it is not inferior to calomel, and can, therefore, be used when the latter is contra-indicated (when iodine preparations are given internally). The author saw granular trachoma entirely disappear in one or two months after insufflations of iodol. HIRSCHMANN.

MINOR (530) relates the histories of five cases in which he had used boric acid powder with great success. The fine powder is dusted over the surface at intervals varying from three times a day to three times a week. BURNETT.

MITTENDORF (531) discusses the affections of the conjunctiva. He first treats of catarrhal conjunctivitis, the cause of which lies in atmospheric conditions, in overtaxing the eyes, in the abuse of alcohol, in impure air, in dust, smoke, snow, great heat, in men working at a fire, in the rapid evaporation of the moisture of the eye, in lessened power of resistance of the body, in older people, etc. The second group includes contagious conjunctivitis, blennorrhœa neonatorum, gonorrhoic ophthalmia, and trachoma; the last named can be transmitted not only directly, but also through flies, eye-glasses, etc. In the last section he discusses atropine-conjunctivitis.

In granular trachoma SCHTSCHEPKIN (532) injects two or three drops of a 2 % solution of carbolic acid with a Pravaz syringe into the subconjunctival tissue. He claims that after two or three such injections the granules disappeared in every case. He never saw any unpleasant consequences. He has thus far treated seven cases in this manner. HIRSCHMANN.

SMITH (533) made the transplantation after the manner of Wolfe, of Glasgow, and was successful. In one other case it was not successful. BURNETT.

WEEKS (534) reviews the literature of the subject very thoroughly, and gives some illustrative cases from practice. The summing up is as follows: Ophthalmia neonatorum is one of the most productive causes of blindness. By far the majority and all the severer forms of oph. neonat. are due to the presence of the gonococcus. This disease is contracted during or shortly after the birth of the child. Proper prophylactic measures may prevent its occurrence. Ophthalmia neonatorum and gonorrhœal conjunctivitis in the adult are very variable in the degree of severity. Both forms of the disease may be controlled in any of their stages by proper treatment. BURNETT.

535. CHAUCEL. De l'emploi de l'ésérine dans les maladies des yeux, en particulier de la kératite ulcéreuse. Thèse de Montpellier, 1886.

536. GALEZOWSKI. De l'emploi du thermo-cautère dans la chirurgic oculaire. *Rec. d'ophth.*, 1886, No. 12, p. 720.

537. GRANDMONT, GILLET DE. Traitement de la keratite infectieuse on des moissoneurs par les lavages frequents avec une solution de sublimé 1:2,000. *Rec. d'ophth.*, 1886, No. 11, p. 671.

GALEZOWSKI (536) recommends the thermo-cautery in trichiasis and entropium, in serpent ulcers, malignant tumors of the cornea, and in tumors of the sclera. He is utterly opposed to enucleation in malignant tumors of the cornea and sclera; he removes them with the knife and finishes the operation with the thermo-cautery. He reports two clinical histories, but fails to mention the vision. In neither case (1½ and 1 year respectively after the operation) was there any relapse. MARCKWORT.

GILLET DE GRANDMONT (537) recommends frequent bathing of the eye with sublimate in serpent ulcers. He first makes Saemisch's cut, washes out the anterior chamber with bromide of mercury 1:20,000 and then prescribes a bath of the eye in sublimate 1:2,000 every hour; after a while the number of baths and the strength of the solution are diminished (1:3,000). He is opposed to cauterizing the ulcers; the galvano-cautery is not mentioned. MARCKWORT.

538. TROITSKI. Free cyst in the anterior chamber. *Wjestnik ophth.*, 1886, No. 6, p. 474.

TROITSKI (538) observed in the left, otherwise perfectly healthy eye of a soldier, a freely movable, reddish-brown, oblong vesicle, 3 *mm* long, 2 *mm* broad, slightly translucent. It had remained

unchanged for several years. The cyst was removed by operation; its contents did not seem to differ from the aqueous. Its walls consisted of fibrillar connective tissue interspersed with pigment and formations resembling leucocytes. The author thinks it analogous to the cysts described by Fucks (*Arch. f. Augenhk.*, vol. xv., No. 1). HIRSCHMANN.

539. FROTHINGHAM, G. E. Some cases illustrating the safety of cocaine as an anæsthetic in cataract-extractions. *Jour. Am. Med. Assoc.*, Aug. 21, 1886.

FROTHINGHAM (539) used cocaine in thirty-one cases. It failed to act as an anæsthetic in three cases. The author has not encountered any of the evil effects reported by some.

BURNETT.

Sections XI.–XX. Reviewed by DR. A. NIEDEN.

XI.—IRIS.

540. LAMBERG, TOR. Bidrag til anomalier hos iris. *Hygiea*, No. 10, p. 615. Stockholm, 1886.

541. LANDESBERG. Contributions to the knowledge of the congenital anomalies of the eye. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 407.

542. LANG. Congenital aniridia. *Trans. Ophth. Soc. Unit. Kingd.*, vol., x., p. 207.

LAMBERG (540) reports a case of anomaly of the iris, in which he observed at the pupillary margin of both eyes several small, blackish-brown, spongy tumors 1–1½ *mm* high which projected into the anterior chamber. He also has compiled the bibliography of similar cases thus far published. SCHJÖTZ.

LANDESBERG (541) describes a case of congenital heterochromia of the blue iris of a person twenty-three years of age. It was covered in its lower half with a streak of bright-black pigment like a coloboma, which extended in a vertical direction from the pupillary to the ciliary margin. Five years later this spot was occupied by a tumor, which proved to be a sarcoma.

LANG (542) observed in a case congenital aniridia of both eyes with lamellar cataract, which in the left was operated unsuccessfully. The patient had three children; the eldest had no defect, but the second and third had similar defects; the second died.

FITZGERALD.

XII.—CHOROID.

543. BRAILEY. Microscopical specimens showing an exceptional condition of the ciliary nerves. Cases of uveitis. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 98.

544. CHIBRET. Note sur un traitement simple de la panophthalmie. *Arch. d'ophth.*, vol. vi., No. 6, p. 545.

545. LANDESBERG, M. Contribution to the knowledge of the congenital anomalies of the eye. Two cases of congenital atrophy of the choroid and retina. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 408.

546. LAWFORD. Nævus of left side of face; nævus of choroid, subretinal hemorrhage, and detached retina in left eye. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v.. p. 136.

547. NETTLESHIP. Severe central choroiditis with almost perfect acuteness of vision; visual field defective at periphery. *Loc. cod.*, p. 147.

548. WAGENMANN, AUG. Contribution to the knowledge of iridocyclitis. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 4, p. 225.

BRAILEY (543) presented microscopical specimens showing an exceptional condition of the ciliary nerves in three cases of uveitis. In the first, the inflammation round the internal long ciliary artery extended into the contiguous portion of the corresponding long ciliary nerve; in the second the condition was the same, but less severe; in the third, that of an eye excised for intense irido-choroiditis, it was again severe. FITZGERALD.

CHIBRET (544) recommends the following method for shortening panophthalmitis, from observations of eight cases: broad incision of cornea with flap downward, opening of capsule, extraction of lens. As soon as the discharge of pus ceases, all the parts infiltrated with matter are removed with iris forceps and intra-ocular irrigation with a sublimate solution of 1:2,000. The two following days the irrigation is repeated when the bandage is changed, and on the third day the patient can be discharged.

v. MITTELSTÄDT.

LAWFORD (546) describes a case of nævus of the left side of the face, nævus of the choroid, subretinal hemorrhage, and detached retina in the left eye, in a child eight years old. It had visited the hospital two years ago as an out-patient, when note had been made that in the left eye there was a cataract, iris bulged forwards, and T increased. The mother had stated then that the eye had only

recently failed. The child had received a blow on the eye some days before admission, complained of severe pain, and for the first time "a yellow color" was noticed in the eye. Slight ciliary injection, cornea clear, anterior chamber shallow, pupil dilated and irregular, lens opaque, yellow, + T_2. On the left side of the face there was a large teleangiectatic nævus extending from the chin to the brow and including the lids. The conjunctiva of the globe was not affected. The microscopical examination of the enucleated globe, which had been hardened, and then cut with the freezing-microtome, plainly revealed the presence of a cavernous angioma of the choroid. FITZGERALD.

NETTLESHIP (547) describes a severe case of central choroiditis with almost perfect acuteness of vision, while the visual field was defective at the periphery. From the history it might be assumed that a large extravasation of blood took place, followed by partial absorption of the choroidal structures. FITZGERALD.

WAGENMANN (548) presents a study of the manifestations of local tuberculosis of the uveal tract. Of course the presence of bacilli and their power to transmit the disease must be shown. The author does not accept primary tuberculosis of the eye. He then adds a short clinical history and description of the microscopical appearance of his case, in which there was tuberculous iridocyclitis of the left eye of a man aged 44, who was probably also suffering from tuberculosis of the right testicle. Inoculation of a rabbit was followed by a well-marked tuberculosis, and bacilli were found in large numbers, while a pure culture of the pus from the anterior chamber was found to consist only of staphylococcus albus.

XIII.—GLAUCOMA.

549. DE BENEDETTI. Irideremia totale congenita. Ectopia lentis congenita con lussatione spontanea del cristallino e glaucoma consecutivo. *Ann. di ottalm.*, vol. xv., 2–3, p. 184.

550. CHISOLM, J. J. An acute attack of glaucoma induced by the local application of cocaine. *Amer. Jour. Ophth.*, 1886, No. 8, p. 229.

551. JACOBSON, J. Contribution to the knowledge of glaucoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 96.

552. RAMPOLDI. Duocentoventotto osservazioni cliniche a contributo della etiologia del glaucoma. *Ann. di ottalm.*, vol. xv., 2–3.

BENEDETTI (549) describes at length the eyes of three brothers and sisters affected with congenital irideremia and ectopia of the lens, who were attacked with chronic glaucoma soon after the age of puberty. Repeated paracentesis of the cornea, sclerotomy, and in one the extraction of the cataractous lens brought only temporary improvement. A fourth brother had normal vision of both eyes, but the ophthalmoscope revealed a small coloboma of the sheath of the optic nerve. The father of the four patients had the same malformation in both eyes, but did not become blind until late in life. His eyes were examined anatomically.

DANTONE.

In CHISOLM'S (550) patient there had been glaucoma in one eye, which was operated fifteen months ago. The cocaine was applied to the other to investigate the pain following the application of nitrate of silver for a conjunctival catarrh. In three-quarters of an hour glaucomatous symptoms supervened, which, however, were subdued by eserine and the artificial leech.

BURNETT.

JACOBSON (551) once more defends v. Graefe's definition of the nature of glaucoma, as consisting in an increase of the intraocular pressure combined with a disturbance of function of the retina and optic nerve (excavation and amblyopia), and expresses the desire uttered once before of coming to an understanding as to the clinical picture of glaucoma, now so polymorphous in conception. He then discusses the question whether the pressure hypothesis holds good also for glaucoma simplex, and concludes from extensive clinical observations that primary simple glaucoma is the result of a gradually diminishing velocity in the choroidal circulation, combined with the secretion of a liquid of the same optical value into the vitreous, thus causing the increase in pressure.

RAMPOLDI (552) presents detailed statistics of 228 cases of glaucoma, observed among 16,371 eye-patients in five years (1.39 %). He discusses the relations of the disease to sex (1.97 % in women, but only 0.87 % in men), to the age and social position of the patients, to the geographical position of their home, and to the season of the year when the affection began. Next he speaks of the form of glaucoma in its relation to the age and social position of the patient, with remarks on the ratio between bi- and monocular occurrence, and the causative or accompanying local ocular affections. Finally he mentions the connection between

refraction and the color of the iris and glaucoma, between heredity and the disease, and its relation to gout and other constitutional affections. DANTONE.

XIV.—SYMPATHETIC OPHTHALMIA.

553. BRAILEY. On the condition of the ciliary nerves in certain conditions of the eye. *Trans. Ophth. Soc. Unit. Kingd.*, 1886, vol. v, p. 98.

554. BRAILEY. Microscopical specimens showing the condition of the ciliary nerves in case of sympathetic disease. *Loc. eod.*, vol. v., p. 99.

555. BRAILEY. Sympathetic disease of one week's standing, indicated by rigidity of the pupil, and a history of two attacks of swelling of the lid, with pains in and about the eye. *Loc. eod.*, p. 100.

BRAILEY (553) concludes, from an examination of 90 eyes primarily with a view of ascertaining whether structural changes of the ciliary nerves had any thing to do with the transmission of sympathetic disease, that inflammation of the ciliary nerves is not an essential factor in its production, and that inflammation *round* the ciliary nerves, though more often present in both exciting and sympathizing eye, is not an essential cause, since it is less marked than the inflammation round the accompanying artery. Inflammation round the long ciliary arteries, though more marked, more constant; and a shorter route, has however little to do with the transmission, for it may be wanting entirely and is as well seen in cases of panophthalmitis which is remarkably free from sympathetic disease. Inflammation of the sheaths of the arteries also occur in iritis serosa. FITZGERALD.

BRAILEY (554) found in his first case, in which the left eye had been excised for loss of sight in iritis, severe inflammation and pain, while the right had been operated upon for cataract eleven months previously, that the long ciliary nerves and arteries were perfectly normal. Also in the second case, in which the eye had been removed on account of sympathetic iridocyclitis.

FITZGERALD.

BRAILEY (555) reports a case of sympathetic disease of one week's standing, indicated by rigidity of the pupil, and a history of two attacks of swelling of the lid, with pain in and about the eye, in which the sympathizing eye recovered, after the local abstraction of blood, exclusion of light, and the use of mercury.

FITZGERALD.

XV.—LENS.

556. ABADIE. Des procédés actuels d'extraction de la cataracte. *Ann. d'ocul.*, vol. xcvi., p. 257.

557. ABADIE. Des enclavements iriens et capsulaires consécutifs à l'extraction de la cataracte avec iridectomie. *Ann. d'ocul.*, vol. xcvi., p. 128.

558. AGNEW, C. R. The after-treatment in cataract and iridectomy operations. *N. Y. Med. Rec.*, July 24, 1886.

559. BROWNE. Zonular cataract and dental malformations. *Ophth. Rev.*, Oct., 1886, p. 277.

560. BUCKLIN, C. A. Report and remarks on a series of 200 cataract extractions. *N. Y. Med. Rec.*, Nov. 20, 1886.

561. CHISOLM, J. J. A revolution complete in the after-treatment of cataract operations. *N. Y. Med. Rec.*, July 31, 1886.

562. FIEUZAL. Cataractes hémorrhagiques et hémorrhagies divers consécutives aux opérations de cataracte. *Bull. clin. nat. opth.*, vol. iv., No. 4, Oct.–Dec., 1886, p. 145.

563. HOTZ, F. C. The rational treatment of patients after cataract operations. *Amer. Jour. Ophth.*, Nov., 1886.

564. JACOBSON, J. A well-sustained opinion on the merits of Daviel's flap-extraction and v. Graefe's linear extraction. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 73.

565. KNAPP, H. Cataract extraction without iridectomy. *Trans. Amer. Ophth. Soc.*, 1886.

566. LANGE, O. Subsequent remarks on a case of spontaneous clearing up of a cataractous lens. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 4, p. 281.

567. LAWRENTJEW. Report on 200 cataract extractions performed in country practice. *Wjestnik Ophth.*, Nov.–Dec., 1886.

568. NETTLESHIP. Spontaneous disappearance of diabetic cataract. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 107.

569. POWER. Case of black cataract. *Loc. eod.*, p. 111.

570. REYNOLDS, D. S. Dressing after extraction of cataract. *Progress*, Aug., 1886.

571. STORY. Zonular cataract and dental malformations. *Ophth. Rev.*, Oct., 1886, p. 277.

572. STRAWBRIDGE, GEO. Report of 261 cases of cataract extraction. *Trans. Amer. Ophth. Soc.*, 1886.

573. WEBSTER, D. Report of 50 cases of cataract extraction, with remarks. *Trans. Amer. Ophth. Soc.*, 1886.

ABADIE (556), like many other French oculists at present, recommends Daviel's flap-extraction. According to him, linear extraction with iridectomy was justly preferred for a time; but since the introduction of antiseptics, eserine, and cocaine, Daviel's method should have the preference. For immature cataracts, and those with posterior synechiæ, Abadie recommends iridectomy. While Wecker, Galezowski, and others still use Graefe's knife, Abadie advocates the re-introduction of a modified Richter's or Beers' knife. MARCKWORT.

ABADIE (557) discusses the incarceration of the iris and lens-capsule following the extraction of cataract. In both cases operative procedures must be adopted if the symptoms of irritation do not soon disappear. In incarceration of the iris, the incarcerated iris is excised, thus somewhat enlarging the artificial coloboma. When a small prolapse occupies one of the angles, an attempt may be made to destroy it with the galvano-cautery. In incarceration of the capsule, Abadie recommends a peculiar method, based on the fact that not the central but the peripheral part of the capsule is incarcerated, that a strain therefore exists between the equator of the capsule and the wound. To cut this part of the capsule, Abadie performs a broad sclerotomy $\frac{1}{2}$ *mm* behind the section made for extraction. In conclusion he recommends extraction without iridectomy, iridectomy being necessary only in complicated cataracts. MARCKWORT.

AGNEW (558) claims that for more than twenty years he has taught the doctrine of the value of light in the wards of an ophthalmic hospital. BURNETT.

BROWNE'S (559) experience teaches him that when zonular cataract is found with a history of fits, the teeth will certainly be malformed; and when zonular cataract occurs independently of fits, the teeth will probably be good. He notes 7 cases, 5 the subjects of fits and exhibiting malformed teeth, 2 with no history of fits and teeth uninjured. To the characteristic teeth met with in these cases, and which have a rude resemblance to rocks fretted by the intermitting action of the waves, he gives the name of "tidal-mark teeth." FITZGERALD.

BUCKLIN (560) operated only 100 of the 200 extractions reported. Of these 96 could read the daily papers, 2 were failures, and in 2 there was disease behind the cataract, which prevented

good vision. The author does not favor cocaine employment in the operation, but uses profound ether anæsthesia. All were done with an iridectomy. BURNETT.

In this second paper CHISOLM (561) records his further trial of the so-called "new method" of discarding bandages and dark rooms in the after-treatment of cataract and other eye-operations. His more extended experience justifies his formerly expressed satisfaction with the method. BURNETT.

FIEUZAL (562) reports several cases of hemorrhage after extraction. In one eye, which had been affected with irido-choroiditis and increased pressure, but had good perception of light, so severe a hemorrhage immediately followed the extraction, that Fieuzal performed exenteration. v. MITTELSTÄDT.

HOTZ (563) condemns dark rooms and forced confinement to bed after cataract operations, frequently allowing patients to sit up and walk about the day of the operation, but he is not disposed to substitute strips of plaster for the bandage. BURNETT.

JACOBSON (564) presents a short critical review on the relative value of Daviel's flap and v. Graefe's linear extraction. He adds two clinical histories of two unsuccessful cases, in which the direct cause of infection of the wound could not be discovered.

KNAPP (565) reports six cases of extraction without iridectomy. In none of these was there incarceration of the iris in the wound, but in three there were posterior synechiæ. Three made ideal recoveries. The chief advantage of the method, to the author's mind, is the perfect freedom of the corneal section from portions of the lens-capsule and iris. BURNETT.

LANGE (566) reports the final result of his observation of the spontaneous clearing up of a cataractous lens, which he published in 1884 (*cfr.* rev., No. 1,112, vol. xv., these ARCH., Ger. ed.). Nothing but a small remnant of the nucleus enclosed in the capsule remained, which he ascribes to absorption of the liquefied and gradually clearing up corticalis.

Three fourths of the extractions performed by LAWRENTJEW (567) were done according to v. Graefe's method. In one fourth he made a less peripheric section and a small iridectomy (sphincterectomy). Eight were failures. Strict antiseptic measures were adopted. The bandage was not changed until the sixth day, if the patient did not complain. HIRSCHMANN.

NETTLESHIP (568) publishes some further notes, furnished by Dr. Tannahill, who reported the case originally in the *Brit. Med.*

Journ. of Jan. 31, 1885. The patient came under observation in 1883. Both lenses were cataractous (symmetrical nuclear cataract) and the vision so defective that the patient could not recognize people or large objects, and could not read ordinary print. Under appropriate treatment his lenses gradually cleared, and the sight so improved that he was able to read very small print with the naked eye. FITZGERALD.

REYNOLDS (570) has long since abandoned bandages in the after-treatment of cataract extraction. He uses a pad of absorbent cotton, held in place by strips of adhesive plaster from the brow to the cheek. BURNETT.

STORY (571) records nine cases of zonular cataract, in five of which the "rhachitic" teeth, as Horner terms them, were present. He considers that there is such a close similarity between lenses and the dental enamel in their origin and development, that it is natural to expect that they will be affected by the same pathological agent. FITZGERALD.

STRAWBRIDGE (572) employed an incision which was a compromise between the Graefe and the corneal flap incisions. In all an iridectomy was made. In about one third an antiseptic dressing of boracic acid was used, but the author does not attach much importance to its use. Cocaine was used in 48 cases, with no evil results attributable to the agent. Successes, 85 %; partial successes, 8.1 %; failures, 6.7 %. BURNETT.

WEBSTER (573) approves of double extractions in judiciously selected cases. The Graefe method was used in all. Successes, 41, or 82 %; partial successes, 6, or 12 %; failures, 3, or 6 %. All eyes were operated on with aseptic precautions. BURNETT.

XVI.—VITREOUS.

574. PROUT, J. S. An anomalous formation in the vitreous humor of each eye. *Trans. Amer. Ophth. Soc.*, 1886.

PROUT (574) supposed the formation to be congenital, since both eyes were affected in nearly the same manner, and that the bodies were the remains of the fœtal circulation. The formation consisted of a narrow band, which had its origin on the temporal side of the disc, bending over that region upward and downward, about 3 or 4 disc diameters from the optic-nerve entrance laterally, and being about 12 disc diameters in length. It arched forward, the two extremities being near two atrophic spots in the choroid. The eyes were myopic and astigmatic; $V = \frac{18}{20}$. BURNETT.

XVII.—RETINA AND FUNCTIONAL DISTURBANCES.

575. BULL, C. S. Analysis of 103 cases of exudative neuro-retinitis associated with chronic Bright's disease. *Trans. Amer. Ophth. Soc.*, 1886.

576. DERBY, H. On the possible retardation of retinitis pigmentosa. *Trans. Amer. Ophth. Soc.*, 1886.

577. v. DUYSE. Un nouveau cas de "colobome" centrale ou musculaire. *Ann. d'ocul.*, vol. xcvi., p. 139, and *Ann. de la Soc. de Méd. de Gand*, 1886.

578. EALES. A case of supposed unilateral albuminuric retinitis. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 126.

579. EATON, F. B. The treatment of detachment of the retina without operation, with a case. *Amer. Journ. Ophth.*, Aug., 1886.

580. FANO. Valeur de l'iridectomie dans le traitement du décollement de la rétine. *Journ. d'ocul. et de chir.*, Oct., 1886, p. 211.

581. HARLAN, G. C. Thrombosis and perivasculitis of the retinal blood-vessels. *Trans. Amer. Ophth. Soc.*, 1886.

582. HARTRIDGE, G. On tobacco amblyopia. *Brit. Med. Journ.*, Jan. 30, 1886.

583. HOLT, EUGENE. Treatment of detachment of the retina. *Amer. Journ. Ophth.*, Nov., 1886.

584. MILLIKIN, B. L. Case of left lateral homonymous hemianopsia. *Amer. Journ. Ophth.*, Oct., 1886.

585. NETTLESHIP. Visual function retained by a retina, which has almost certainly been detached for several years. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 133.

586. RISLEY, S. D. Albuminuria of pregnancy. Retinitis. Induced premature delivery. *Trans. Amer. Ophth. Soc.*, 1886.

587. TROUSSEAU, A. Les rétinites urémiques. *Bull. de la clin. nat. de l'hôp. des quinze-vingts*, vol. iv., No. 4, Oct.–Dec., 1886, p. 173.

588. WAITZFELDER, E. A case of bitemporal hemianopsia. *N. Y. Med. Rec.*, Nov. 20, 1886.

In 56 cases of BULL (575) the duration of the renal disease was unknown. In 47 it was varied from 6 months to several years. The two sexes were affected about equally. The ages varied

from 5 to 78 years. V ranged from $\frac{20}{20}$ to zero. In all both eyes were affected sooner or later. The retina alone was affected in 80 cases, both optic nerve and retina in 25 per cent. of the cases. Hemorrhage in both eyes was noted in 46 cases, in the right eye alone in 11; in the left alone in 12; in 34 there were none. There was hypertrophy of the left side of the heart without valvular disease in 79 cases; with valvular disease, 16. Cardiac disease developed while the patient was under observation in 5 cases. Of the 86 who died, 57 died in the first year; 18 within the second; 6 within the third; 4 within the fourth, and 1 within the sixth. BURNETT.

H. DERBY (576) relates two cases of retinitis pigmentosa, in which the visual fields were enlarged by the use of the constant current three times a week for three months. Vision was but little improved. The notes of another case of Dr. Standish are given, in which both field and vision were improved by the same means. BURNETT.

VAN DUYSE (577) publishes another case of central "coloboma." In discussing these so-called "colobomas," Van Duyse contends that these cases must not be considered true colobomas, as the choroid and retina are not absent over these spots, but have undergone a pathological change (fœtal choroiditis). MARCKWORT.

EALES' (578) case exhibited diffuse and destructive retinitis of the albuminuric type in one eye only, and for a period of nearly four months, during which time the patient suffered from albuminuria. He had been a heavy drinker, and had met with a severe fall, which had wrenched and injured his left side and loins. The vision in the affected eye was observed to be defective the following morning. Eales alludes to a case reported by Yvert, who quotes five cases published by Potain, in which there was anasarca of one side, or at least more marked on one side, in consequence of a contusion of one kidney. In explanation of this Potain considers an abnormal action of the sympathetic nerve of one side of great importance. FITZGERALD.

EATON (579) gives the history of a case of detachment of the retina, with drawings of the visual field, which was treated successfully by diaphoresis, pilocarpine, and Turkish baths. BURNETT.

FANO (580) reports three cases of detachment of the retina, in which he performed iridectomy; in none of them was there any

improvement after the operation. According to Fano, iridectomy in detachment of the retina must be regarded as antiphlogistic treatment of the causative choroiditis. If the choroiditis is favorably influenced by the operation, the subretinal exudation may disappear and the retina resume its normal position ; but if the choroiditis is not affected thereby, no improvement as regards the detachment can be expected. MARCKWORT.

HARLAN'S (581) patient was a married woman 33 years of age. She had a miscarriage in Jan., 1886. In May, 1886 she noticed suddenly a dimness of vision in the left eye, and in 24 hours there was no perception of light in this eye. No uterine, kidney, or heart trouble. The ophthalmoscope showed all the retinal blood-vessels completely transformed into white bands, in none was there any blood whatever. There was a small artery filled with blood running from near the centre of the disc upward. There were remains of hemorrhages in the retina. There were also some retinal hemorrhages in the other eye. The picture of another retina was shown in which some of the vessels were undergoing the same change. The author is inclined to consider the condition due to perivasculitis. BURNETT.

HARTRIDGE (582) gives an analysis of 20 consecutive cases of tobacco amblyopia. In all the vision was improved, and in 13 recovery took place. Treatment consisted mainly in the total discontinuance of smoking. Half the cases got strychnia and the other half a placebo, with apparently equal results. Galvanism was used in three cases with no appreciable effect. MAXWELL.

HOLT (583) reports that he has twice successfully treated detachment of the retina by confinement (not recumbent) and bandaging, atropine and hypodermic injections of pilocarpine. BURNETT.

MILLIKIN'S (584) patient, a man of 40, became unconscious and delirious, often vomiting and purging, and remained so for 10 days. No paralysis. Left hemianopsia. BURNETT.

In NETTLESHIP'S (585) case there was universal detachment of the retina from the edge of the disc as far as could be seen. The greater part of the retina remained fairly, if not quite transparent. With various glasses from + 8 to + 18 D fingers could be counted at 1' and letters in 20 J and a few in 18 J could be made out. FITZGERALD.

In RISLEY'S (586) case pregnancy had advanced to about the fifth month. Typical retinitis Brightii. The induction of pre-

mature labor put a stop to the progress of the albuminuric symptoms, and the retinitis subsided with no essential impairment of vision. BURNETT.

TROUSSEAU (587) observed several cases of retinitis albuminurica, in which repeated tests failed to show the presence of albumen in the urine; the albumen, like the œdema, not appearing until later. v. MITTELSTÄDT.

WAITZFELDER'S (588) patient was a man 18 years of age. No history of syphilis. In addition to the temporal hemianopsia there was slight neuroretinitis leading to atrophy. The antemortem diagnosis is a tumor, probably a sarcoma, anterior to the chiasma and pressing on the internal fasciculi of both optic nerves. BURNETT.

XVIII.—OPTIC NERVE.

589. ALT, A. One hundred and twenty cases of anæmic and atrophic condition of the optic nerve and retina. *Amer. Journ. Opth.*, Aug. and Sept., 1886.

590. RAMPOLDI. Atrofia ottica susseguita a blefarite gangrenosa. *Ann. di ottalm.*, vol. xv., 2–3, p. 113.

ALT'S (589) cases are tabulated in full, of which we can give only an abstract. There are 95 men and 25 women. In 19 the cause was central (cerebral or spinal). In 51 cases the cause was alcohol and tobacco, alone or combined. Of these there were 7 in which tobacco seemed to be the sole cause, and 3 in which it was attributed to alcohol alone. BURNETT.

RAMPOLDI (590) observed in a lady, aged 40, left-sided complete amaurosis from acute atrophy of the optic nerve, which had developed within a month from gangrenous erysipelas of the upper lid of the same eye. DANTONE.

XIX.—INJURIES (FOREIGN BODIES) AND PARASITES.

591. v. HIPPEL, A. Injuries of the eye with dynamite. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 3, p. 205.

592. KNIES, M. Case of injury to the eye by lightning. *v Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 236.

593. MURRELL, T. E. A remarkable case of foreign body carried ten years in the eye. *Journ. Amer. Med. Assoc.*, Oct. 23, 1886.

594. RANDALL, B. A. A case of subluxation of the lens

with double rupture of the choroid ; recovery with good vision. *Trans. Amer. Ophth. Soc.*, 1886.

595. SNELL, S. A. A case of iron splinter on the anterior capsule of the lens. *Brit. Med. Journ.*, Nov. 13, 1886.

596. WEBSTER, D. A case in which vision was totally obliterated by a gun-cap in the eye. *N. Y. Med. Rec.*, July 24, 1886.

597. WEBSTER, D. Removal of a piece of steel from the crystalline lens. *Amer. Journ. Ophth.*, Aug., 1886.

HIPPEL (591) saw among 3.471 patients 554 cases of severe injury = about 16 %, 20 of which were produced by dynamite (in 17 cases both eyes and in 3 only one). The final condition was so unfavorable that no other affection of the eye can be compared with it, as of the 20 persons injured 8 became totally blind in both and 7 in one eye, and only 2 were able to resume their occupation as miners. The entrance of chemically injurious substances (nitro-glycerine and silicious marl) explains the poor prognosis which must be made in perforating wounds due to dynamite.

KNIES (592) observed in a boy aged ten, who had been struck by lightning, direct combustion of the skin of the face, singeing of the eyelashes, conjunctivitis and keratitis of both eyes, paralysis of both levatores, and incomplete ptosis, which disappeared in four weeks. In the right eye there was also ribbon-shaped cataract and large stellate posterior polar cataract, while in the left broad cataractous bands were just beginning to form. The latter condition, as well as the amaurosis of the right eye, disappeared spontaneously ; the cataract of this eye was extracted ; the lens-capsule was much thickened.

MURRELL (593) enucleated an eye which had been injured ten years previously by the explosion of a glass retort, destroying sight. After the first inflammation had subsided there was no inconvenience felt in that or the fellow eye. The eye, however, was taken out, and a piece of glass found encysted in the vitreous in a plane parallel to the iris. It was 15 *mm* long, 12 *mm* wide, and 1½ *mm* thick. BURNETT.

In RANDALL'S (594) case, one of the ruptures was in the usual place, near the macula, the other quite unusual, just at the inner lower edge of the disc. There was also a large area of pigmentation of the choroid on the temporal side of the disc. Two excellent chromo-lithographs accompany the paper. BURNETT.

SNELL (595) describes a case where an iron splinter was embedded in the anterior capsule of the lens. After holding the electro-magnet for some time in contact with the cornea, the piece of iron sprang forward and was then guided to the periphery and removed through a small incision. MAXWELL.

In WEBSTER'S (596) case, the gun-cap was found, after enucleation of the eyeball, embedded in the retina at the entrance of the optic nerve in such a manner as to cut off all communication between the retina and nerve. BURNETT.

WEBSTER (597) reports a case in which the foreign body had passed through the iris and penetrated the lens, projecting about a line into the anterior chamber. No attempt was made to introduce a magnet, but the steel with its capsule of lymph and a part of the iris was removed with forceps. At time of discharge V = $\frac{20}{200}$.
BURNETT.

XX.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

598. BULL, C. S. A consideration of some unusual forms of intraocular hemorrhage, with special reference to etiology and prognosis. *N. Y. Med. Rec.*, Dec. 4, 1886.

599. BOREL, G. Affections hystériques des muscles oculaires (clinique du Dr. Landolt). *Arch. d'ophth.*, vol. vi., No. 6, 1886, p. 481.

600. CARL THEODOR, DUKE IN BAVARIA. Contribution to the pathological anatomy of the eye in kidney diseases. With 12 plates. Wiesbaden, Bergmann, 1887, 77 pp.

601. CARTER, BRUDENELL. A case of amblyopia, caused by malaria fever. *Brit. Med. Journ.*, Jan. 30, 1886.

602. EDMUNDS and LAWFORD. Further observations on the condition of the optic nerves in intracranial disease. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 102.

603. FÉRÉ. Notes pour servir à l'histoire de l'amblyopie hystérique, exercise de la sensibilité. *Rec. d'ophth.*, 1886, No. 10, p. 606.

604. FROST. Case of conjugate deviation of the eyes down and to the right. *Trans. Ophth. Soc. Unit. King.*, vol. v., p. 197.

605. GRUENING, E. Case of tumor of the left occipital lobe, with right homonymous hemianopsia (with autopsy). *Trans. Amer. Ophth. Soc.*, 1886.

606. GUNN. Symmetrical enlargement of upper part of face,

with double proptosis and optic atrophy, complete anosmia and paralysis of left portio dura. *Trans. Opth. Soc. Unit. King.*, vol. v., p. 180.

607. JACKSON, EDW. The relation of eye-strain to headache. *Trans. Penn. State. Med. Soc.*, 1886.

608. JEAFFRESON, C. S. On so-called "lead-neuritis." *Brit. Med. Journ.*, Feb. 27, 1886.

609. LICHTWITZ, L. Des zones hystérogènes observées sur la muqueuse des voies aériennes supérieures, des organes de sens, et en particulier de l'œil et de l'appareil lacrymo-nasal. *Rev. clin. d'ocul.*, vii., No. 11, Nov., 249 pp.

610. NETTLESHIP. Purulent iridocyclitis. *Trans. Ophth. Soc.*, vol. v., p. 102.

611. PANAS. Amaurose double déterminée par une méningite chronique de la base du cerveau. *Rec. d'ophth.*, Nov., 1886, p. 651.

612. PASTERNATZKY, F. On the unequal width of the pupil in internal diseases (from the clinic for diagnosis and general therapeutics of Prof. Tschudnowsky). Preliminary notice. *Wratsch*, 1886, Nos. 49 and 51.

613. RAMPOLDI. Osservazione di neurite ottica coincidente con morbo di Aran. *Ann. di ottalm.*, vol. xv., 2–3, p. 116.

614. RAMPOLDI. Sui rapporti morbosi che sono tra l'apparato circulativo e il visivo. *Ann. di ottalm.*, vol. xv., 2–3, p. 171.

615. RAMPOLDI. Guarigioni inesplicabili del panno corneale. *Ann. di ottalm.*, vol. xv., 2–3, p. 112.

616. SCHLEICH. The eyes of the epileptics at the Institute Schloss Stetten in Wuerttemberg. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 469.

617. SNELL. Recurrent paralysis of third nerve in association with migraine. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 193.

618. UHTHOFF, W. Investigations on the influence of chronic alcoholism on the human eye. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 4, p. 95, and vol. xxxiv., 1.

619. WICK, D. M., and ALT, A. A case of rapidly growing tumor of the brain; atrophy of both optic nerves without neuritis. *Am. Jour. Ophth.*, Nov., 1886.

BULL (598) gives the history of 17 cases in which there seemed to be some connection between the intraocular hemorrhage and

severe malarial poisoning. The hemorrhages, the author thinks, were in the main due to rupture of the choroidal or ciliary vessels or possibly the vessels of the optic nerve sheath during the febrile or congestive period of the attack. They very seldom entirely disappear. He has had no good effect from jaborandi or pilocarpine or the electric current. He depends altogether on building up the general system. BURNETT.

In the introduction to his paper BOREL (599) points out the close connection between the hysterical and so-called reflex disturbances of the ocular muscles. He believes that a large part of the latter are due to hysteria, which frequently can only be recognized with great difficulty as the cause, but which often gives rise to reflex symptoms. Borel also discusses the influence of hypnotism in its various phases—somnambulism, catalepsy, lethargy—and of hystero-epilepsy on the movements of the eye. He mentions the wide open, staring state of the palpebral fissure in the cataleptic condition, which can be changed to the lethargic by closing the eye. In the latter condition the eye is generally closed, though in both the reverse sometimes occurs. Genuine cataleptic manifestations on the part of the ocular muscles, however, have been observed. There may also be convulsive contractions of individual muscles, conjugate deviation, blepharospasm, while hystero-epileptic attacks may be preceded by spasms of individual muscles and of the lids, and by disturbances of accommodation. The author then discusses the individual muscular disturbances: spasms and paralysis due to hysteria. Among the former blepharospasm is the most common. The various forms are discussed at length. MITTELSTÄDT.

The DUKE CARL THEODOR (600) bases his paper on the pathological anatomy of the eye in kidney diseases on the examination of 15 eyes, a relatively large number, which enabled him to present the pathological changes in the individual membranes not only in the early and middle stages, but also in the advanced stage of the disease. A gap in our knowledge of the various phases is thereby filled out. The principal typical condition in the early stages is an arteriitic process more or less marked in all the blood-vessels of the eye. The main changes are therefore found in the choroid, as the products of inflammation are observable not only in the stratum of the blood-vessels, but also diffusely spread through the membrane itself, while the degenerative changes are principally localized in the papilla and retina. The pre-

dilection of the disease for these two membranes may be due (1) to the existence of a closed system of capillaries in the choroid, and (2) to the fact that the retinal blood-vessels are in a certain sense terminal arteries. The author comes to the conclusion that the arteriitic process begins in the outer layer of blood-vessels. Twelve excellent plates illustrate the microscopic conditions.

BRUDENELL CARTER (601) reported a case of high degree of amblyopia after malaria to the Clinical Society of London. The patient was a man aged 35, whose V had sunken to quantitative perception of light. Sublimate and iodine were given internally, and strychnine was injected, whereupon V again became normal, and J. No. 1 was read, although the sheath of the optic nerve remained pale ; the blood-vessels were fuller.

EDMUNDS and LAWFORD'S (602) communications have reference to the authors' former communication published in the third volume of the Transactions. The conclusion they arrived at was that the optic neuritis in intracranial disease is due to the direct propagation of inflammation from the meninges at the base of the brain to the meninges of the optic nerve and to the nerve itself. On the present occasion they report 13 cases, and taken as a whole they consider them confirmatory of the conclusions arrived at previously. FITZGERALD.

FROST'S (604) patient, æt. 25, gave history rather unsatisfactorily, but stated that three years ago he had suddenly fallen down unconscious and remained so for twenty minutes, had vomited on the following day, and on the third day had again become unconscious and remained so for eight or ten days ; he then found that the right leg dragged. The foot is everted and dragged in walking. Both eyes are deviated downwards and to the right. The left appears on a lower level than the right. The eyelids droop. The eyes cannot be moved, except farther downward and to the right. If one eye is covered the other can generally follow the finger in all directions. The left more frequently fails in this than the right. O. D.V = $\frac{20}{30}$, O. S.V = $\frac{20}{30}$. Fundus of both normal. FITZGERALD.

GRUENING'S (605) patient was a man 55 years of age. He had severe headaches, but no other important nervous symptoms. Typical right homonymous hemianopsia, and choked disc. The entire left occipital lobe was occupied by a tumor, which, on microscopic examination, proved to be a spindle-cell sarcoma.

BURNETT.

The case reported by GUNN (606) was that of a woman æt. 22, married, who attended at Moorfields Eye Hospital in June, 1885. Health had been good up to the age of 16. For nine months preceding onset of catamenia she had suffered almost daily from severe neuralgia in temples, her face had also swollen and sense of smell practically lost. No further ailment till she became pregnant, when she suffered from frequent vomiting for about three months. Some time later began to suffer from severe neuralgic pain in both temples,—worse in left. Two months before her confinement sight of left eye began to get dim, and two days before the birth of the child she became quite blind in this eye—which continued for one month—then the vision gradually improved, but again she became suddenly blind in the eye. The day after the baby's birth sight went "altogether" in the right, and continued so for a fortnight. Then it began steadily to improve. When V began first to fail she noticed that her face was slightly swollen and the eyeballs prominent. When seen at the hospital there was some thickening and marked tenderness over the whole of both superior maxillary bones, and over the ramus of the jaw on both sides. Subsequently paralysis of left portio dura showed itself, and sight gradually became worse, and the last note states there was no perception of light in either eye.

FITZGERALD.

JACKSON (607) relates several cases of eye-headache, in which the proper glasses gave relief. The author thinks the headaches from eye-strain are of double parentage, one parent being the strain on the eye muscles, the other the impaired nutrition of the nerve-centres, and that both should be looked after.

BURNETT.

JEAFFRESON (608) doubts the existence of a primary disease of the optic nerve or retina due to lead. He thinks most of the cases are secondary to kidney disease coused by lead, others are the result of sudden effusion into the ventricles or subarachnoid space in the brain, while a proportion are due in women to suppression of the menses, which often happens in lead-poisoning.

MAXWELL.

LICHTWITZ (609) reports the case of an hysterical woman, aged 29, who had suffered for two years with cramps, right-sided gonalgia and hemianæsthesia, and who presented many hysterogenic zones, by touching which cramps, cataleptic and lethargic conditions could be produced. The principal surfaces were those of

the nasal cavity, of the posterior aspect of the velum palati, the outer ear canal, and the membrana tympani. The spasmogenic zones did not disappear when cocaine was injected into the nose. The conjunctiva of the right eye is not sensitive to touch, the cornea of that eye is slightly sensitive, in the left eye also the sensibility is reduced, with the exception of the cornea. When these parts in the right eye are rubbed with a probe or with the lids, a cataleptic condition is produced; when the same is done in the left eye, the patient falls into a lethargic sleep. The former condition can also be changed to the latter in this manner. The result is similar when a probe is introduced into a lachrymal canal. Probing the naso-lachrymal canal produces cramps. The hysterogenic zone of the conjunctiva disappears when cocaine is used. The author excludes simulation. In other patients with hysterogenic zones of the respiratory passages, there were none in the eye. The naso-lachrymal canal was not examined.

V. MITTELSTÄDT.

In cases of destructive ophthalmitis in young children, simulating glioma, NETTLESHIP (610) has already directed attention to the frequency with which such eye attacks coincided with severe general illness, often accompanied by cerebral and sometimes pyaemic symptoms. The case now reported was watched from the beginning, and was that of a child who died of cerebro-spinal meningitis, probably due to purulent otitis. Nettleship points out the probability that the eye-disease and meningitis were pyæmic. If pseudo-glioma is the result of suppurative phlebitis, we must assume that recovery from pyæmia is comparatively common in very early life. FITZGERALD.

PASTERNATZKY (612) generally found unequal width of the pupils in those constitutional diseases in which there is a distinct anatomical lesion, generally on one side only (croupous pneumonia, pleuritis, renal colic, affections of the heart and liver). The various diseases may be ranged as follows, as regards the frequency of occurrence of this symptom:

In croupous pneumonia, inequality of the pupils occurs in	85	% of all cases.
In heart-disease and aneurysm of the aorta .	61	" " "
In pleurisy	52	" " "
In catarrhal chronic pneumonia . . .	38	" " "
In acute rheumatism of the joints . .	25	" " "
In catarrh of the respiratory passages . .	25	" " "

In scurvy	16 %	of all cases.
In typhus fever	16	" " "
In febris recurrens	15	" " "
In typhoid fever	13	" " "

In croupous pneumonia the pupil of the affected side is larger in the beginning of the process; the maximum of dilatation is reached at the height of the disease. Shortly before the crisis, and during the latter, the pupils become equally wide, while during convalescence the pupil of the affected side becomes smaller. The author believes that the inequality of the pupils in internal diseases is a reflex phenomenon in close connection with the process of disease, the nature of which has not yet been determined. HIRSCHMANN.

RAMPOLDI (613) has twice observed neuro-retinitis in persons who were suffering from progressive atrophy of the muscles of the shoulder. He asks whether both diseases may not be due to the same cerebral process. DANTONE.

RAMPOLDI (614) reports several cases of eye-disease, especially of functional disturbances, which could be referred with certainty to cardiac disease, or atheromatous degeneration of the walls of the blood-vessels. DANTONE.

RAMPOLDI (615) reports several cases of corneal pannus, which had been treated with very slight success, but which cleared up rapidly during several constitutional diseases (pneumonia, erysipelas, cholera). DANTONE.

SCHLEICH (616) reports the results of his investigations of the eyes of 127 epileptics. There were no marked changes in the fundus, the absence of optic neuritis, choked disc, and well-defined atrophy being especially noticeable, while slight deviations from the normal were of frequent occurrence. The absence of congenital anomalies is also noteworthy, as well as the frequent occurrence of hypermetropia and strabismus, and the absence of paralysis of the muscles.

SNELL'S (617) case was that of a child aged 8, who, since she was 18 months old, had from time to time been subject to attacks of ptosis and paralysis of the third nerve. The attacks came on with sickness of stomach, intense pain in the head, and constipation. The parents gave a neurotic history. The father suffered from "tic," and the mother was subject to headaches.

FITZGERALD.

UHTHOFF'S (618) paper on the influence of chronic alcoholism

on the human organ of vision is based on very extensive and accurate observations of a very large material. It treats, in the first place, of the pathologico-anatomical changes in the optic nerve, which were found to be due to specific retrobulbar optic neuritis, as was proven by the post-mortem examination of the relatively large number of six cases. Then follow the clinical histories and a description of the microscopical condition, to which is added that of a case of tabes, with unilateral quadrant-shaped atrophy of the optic nerve, as it forms an important contribution to our knowledge of the course of the fibres in the optic nerve, in connection with the cases of retrobulbar neuritis from alcoholism with degeneration of the papillo-macular fibres. Uhthoff confirms the results found by other observers as to the course of the fibres in the optic nerve, chiasma, and tractus, except in a few unimportant particulars. He did not find that the shape of the degenerated portion changed so rapidly from the oval to the wedge at the entrance of the blood-vessels into the nerve, as found by Samelsohn ; neither did he find that the layer of ganglion cells had completely disappeared in the corresponding part of the retina. Uhthoff then adds the results of the ophthalmoscopic examination of 1,000 patients suffering from severe alcoholism, and likewise of 100 cases of toxic amblyopia, according to which pallor of the temporal half of the disc was observed in 13.9 % of all cases of severe alcoholism. For the interesting particulars see the original.

The patient of WICK and ALT (619) was a young farmer of 27, who presented the usual history of cerebral growths. Alt made the ophthalmic examination and the histological examination of the tumor. The latter was found to be a round-cell sarcoma. There was no optic neuritis ; but the optic nerves were both embedded in the growth, which had invaded the orbit, having broken through the posterior orbital wall. The growth had also invaded the optic-nerve tissue itself in places. BURNETT.

REVIEWS.

CHAS. F. PRENTICE. **A Treatise on Simple and Compound Ophthalmic Lenses,** their refractive and dioptric formulæ, including tables of crossed cylinders and their spherocylindrical equivalents. N. Y.: James Prentice & Son. Pp. 40. Price $1.50.

Of all the simple non-mathematical treatises on the properties of lenses that we have seen, this is incomparably the best. The style of the text is, at times, a trifle awkward, but the diagrams are of such surpassing excellence as scarcely to need explanation. The teacher of the average medical student will hail this little work as a great boon, for while there is not a formula in the book, the whole of the fundamental principles of refraction (excluding, of course, any special application to the size and distance of the image) are represented with the greatest simplicity and clearness. The diagrams showing refraction by cylinders and sphero-cylinders are peculiarly happy in their clearness.

DR. L. WEBSTER FOX and GEO. M. GOULD. **Compend of the Diseases of the Eye,** including refraction and surgical operations. Quiz compends. No. 8. Pp. 148. Phila.: P. Blakiston, Son, & Co. 1886. Price $1.00.

This little work is designed, as are so many others, for the use exclusively of the student and general practitioner, and therefore criticism from the standpoint of the specialist is, in a measure, disarmed. It is interesting, however, to note, in looking over such a work, what the authors consider of most importance and as expressing their ideas of the essential principles of the science of ophthalmology.

In examining this small brochure after this manner, we find the authors open-eyed, active and alert in grasping new ideas,

and quite happy in putting these ideas tersely and some of them with quite a degree of originality. This desire for originality, we regret to observe, has on some occasions a tendency to pass the limits of a simple scientific statement of a fact, and to become, in no small degree, sensational. Examples of this are the following, among the "clinical hints and maxims": "Myopia is produced by the belief that to read a newspaper (to be told what other people see) is of more value than to see for one's self." "Astigmatism is an invisible and elusive imp of mischief, requiring much keenness and patience to hunt him down. His hiding-place is the ciliary muscle; his disguise amblyopia. He hates atropia as his father is said to hate holy water."

The statistical reports given in the appendix are not sufficiently extensive or accurate to be of much value, and it is to be regretted that they were not made fuller.

On the whole, however, the work is cleverly and judiciously done, and the young practitioner who relies on it cannot go far wrong.

FERD. v. ARLT.

OBITUARY BY DR. C. HORSTMANN.

[Translated by H. KNAPP.]

On the 7 May, '87, F. v. Arlt, the Nestor of German ophthalmologists, died in Vienna after long suffering. Together with Donders and the too-soon-departed A. v. Gräfe, they were the most brilliant stars in modern ophthalmology. Born on the 18th of April, 1812, the son of a poor blacksmith in Obergraupen by Teplitz in Böhmen, he was brought up among the simplest surroundings. At his eighth year he was taken to one of his relatives, a school teacher at Weisskirchlitz to be brought up for the same calling.

When thirteen years of age, showing no inclination to become a teacher, he entered with his elder brother Dominick, the Lyceum at Leitmeritz, where he was prepared for the clergy. From the third year at the Lyceum, he made his living by giving lessons. In 1831 Arlt and his brother entered the university at Prague, and following his inclination for natural sciences, studied medicine instead of theology. He was able to do so by accepting the position of tutor. Of all his teachers, the professor of ophthalmology, J. N. Fischer, inspired him most, and awakened in him his predilection for this branch of medicine. Arlt graduated in 1839. Having attended for three months, the lectures and demonstrations of Rokitansky and Skoda, besides the operating courses of Fried. v. Jäger, in Vienna, he was appointed assistant physician to Fischer's eye-clinic, which position he retained until 1842. In that year he settled in Prague as a physician, practising medicine and surgery besides ophthalmology until 1846, when on Fischer's nomination he was chosen assistant professor of ophthalmology. In 1849, declining a call to Leipzic, he obtained the regular pro-

fessorship at Prague, which he held until 1856. During that time he contributed to the literature of his specialty, a number of excellent works of which we need only mention his text-book on the "Diseases of the Eye." (3 vol. Prague, 1851, 1853, and 1856.)

In 1855 he entered, with C. Donders, into the editorial staff of the *Archiv für Ophthalmologie*, founded by A. v. Gräfe. Although the number of papers which Arlt published in this journal is comparatively small, they were all distinguished by the clearness of their contents and their valuable anatomo-clinical investigations.

In 1856 Arlt received and accepted the appointment to the chair of ophthalmology at the University of Vienna, made vacant by Rosas' death. He occupied this position interruptedly until July, 1883, when, having passed his seventieth year, in undiminished mental strength, he resigned his office in compliance with the laws of Austria. What he has accomplished in Vienna as a teacher, scientist, and ophthalmic practitioner, is still so fresh in our memory as to require no further mention. By his retirement Arlt's scientific and practical labors received no restraint whatever, of which fact his papers, "On Glaucoma," and "On Extraction of Cataract," appearing at that time, are sufficient evidence.

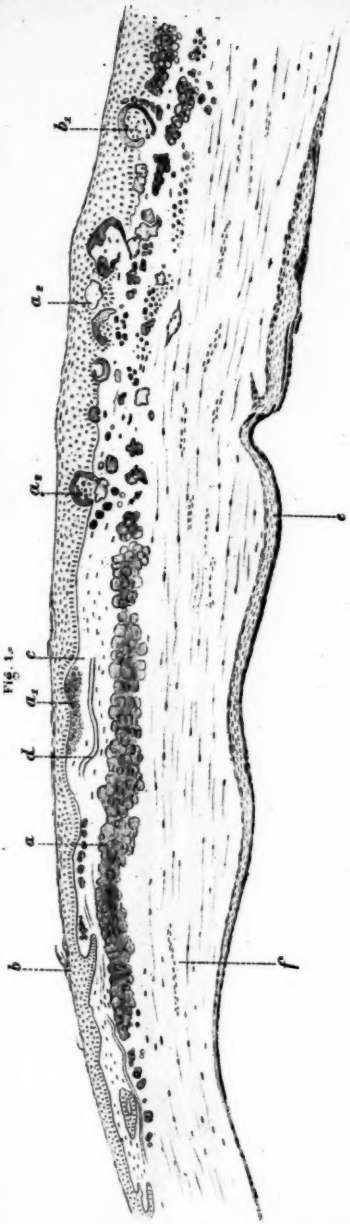
During the summer of 1886 he was suddenly seized with gangrene in his left leg, necessitating its amputation. Owing to his hardy constitution, he recovered promptly from this operation, but relapses soon appeared, until after long suffering, relieved by the devotion of his affectionate daughter, he died a few weeks after his seventy-fifth birthday.

Arlt was in the truest sense of the word a "self-made man." By means of his very extraordinary ability, his uncommon energy, and his untiring industry, the son of a poor blacksmith succeeded in acquiring the highest academical honors. It is one of his merits that ophthalmology, from being an appendage of surgery, rose to the rank of an independent science. His penetrative mind recognized the etiological conditions of the diseases of the eye. His anatomo-pathological investigations are the first remarkable attempts in ophthalmology. Before any other we have to give Arlt credit for having established the fact that myopia depends on a prolongation of the antero-posterior diameter of the eyeball. To cite all his papers, which in their scientific aims never neglected practical points of view, would lead too long. We can mention only the most important ones: "Care of Eyes in Health

and Diseases," together with an appendix on eye-glasses (Prague, 1846); "Diseases of the Eye" (3 vol., Prague, 1851, 1853, 1856); "Accidents to the eye" (Vienna, 1875); "Operative Surgery of the Eye" (Gräfe-Sämisch, Encyclopedia of Ophthalmology, vol. iii., part 2. Leipzig, 1874); "Shortsightedness, its Origin and Causes" (Vienna, 1878); "Clinical Exposition of the Diseases of the Conjunctiva, Cornea, and Scelera, also of the Iris and Ciliary Body" (Vienna, 1881); "Contribution to the Knowledge of Glaucoma" (Vienna, 1884).

Arlt was the first to give an impulse to the introduction of test-types, which, as is well known, were greatly improved by E. v. Jäger, and more especially, by Snellen. It was likewise owing to his initiative that the selection of spectacles is no longer made in a routine way by the optician, but based on scientific principles by the oculist. Arlt stood at the head of his time, not only as a scientific investigator, an excellent oculist, and a prominent operator; but also as an academic teacher, he was of the first importance. His delivery did not excel by its rhetorical art or ingenious sentences, it was the simplicity and clearness of his speech, the precision of his expressions, the logical analysis of the morbid process that captivated his audience. Physicians of all parts of the world, almost all of the prominent living oculists, have attended his clinics for a shorter or a longer time, to learn his views by personal observation. Also A. v. Gräfe, who was his junior by seventeen years, visited him at Prague in the fall of 1848, and not in a low degree, it was Arlt's merit to have induced the most eminent ophthalmologist of all times to devote himself exclusively to the study and cultivation of that branch of medicine. With great pride, he said of his previous pupil, to whom he was connected by the most intimate friendship, that from the former teacher he had become the pupil of von Gräfe. The majority of the late assistants of Arlt's are now engaged as professors at different universities; *e. g.*, Businelli at Rome, Rydel at Krakau, O. Becker at Heidelberg, Schuleck at Budapest, Fuchs at Vienna, Sattler at Prague. Others have gained an excellent reputation as ophthalmic practitioners, *e. g.*, Arlt jun., Bergmeister, v. Reuss, and Köller in Vienna, Kirschbaumer at Salzburg, Brettauer at Trieste, and Denk at Luiz. In spite of the high station at which Arlt had arrived, his life was distinguished by uncommon simplicity and contentedness. A touching goodness of heart was one of his prominent character-

istics. Never forgetting how full of hardship his own youth had been, he always had an open hand to his needy fellow-men. He was a fatherly friend to the poor student. He always retained a warm attachment to his home in the Bohemian mountains, and every year he visited his birthplace to aid the numerous people afflicted with diseases of the eye in that vicinity. Not only has the old Vienna medical school, so famous by Rokitansky, Oppolzer, Skoda, Pitha, Hebra, and others, lost by the death of Arlt its last representative, but the whole ophthalmological world. Thousands of thankful patients and pupils, mourn with deepest sorrow the decease of Arlt, whose name will occupy a permanent place in the history of ophthalmology.



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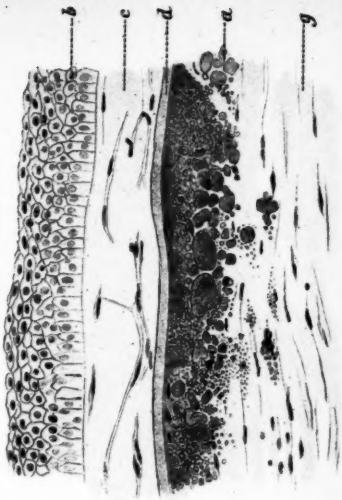

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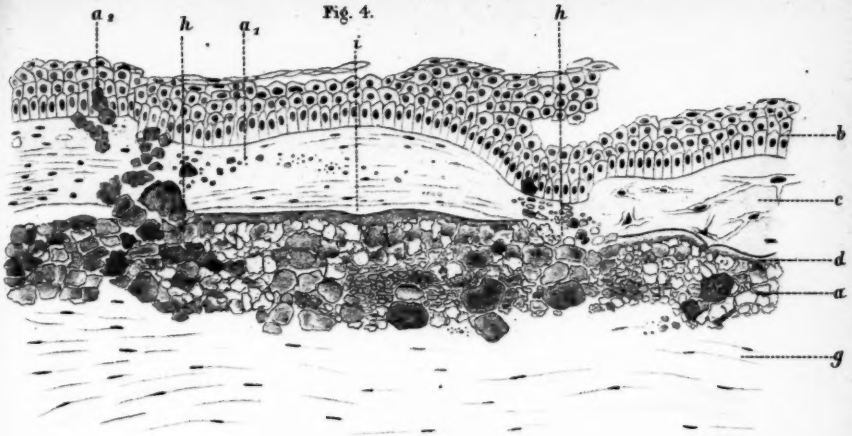

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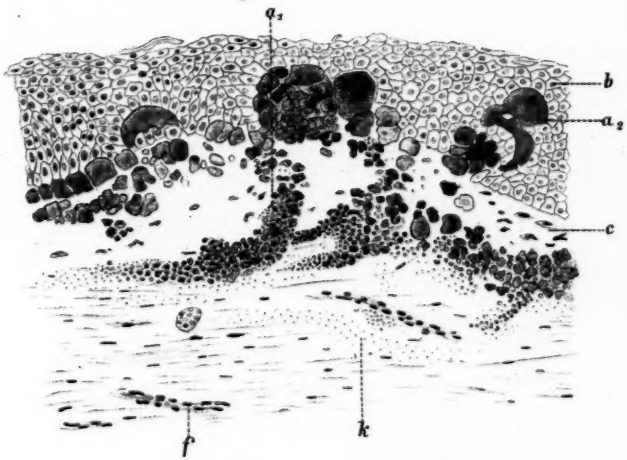

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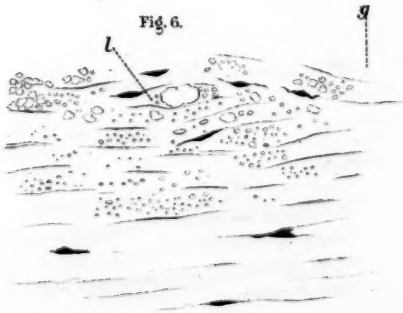

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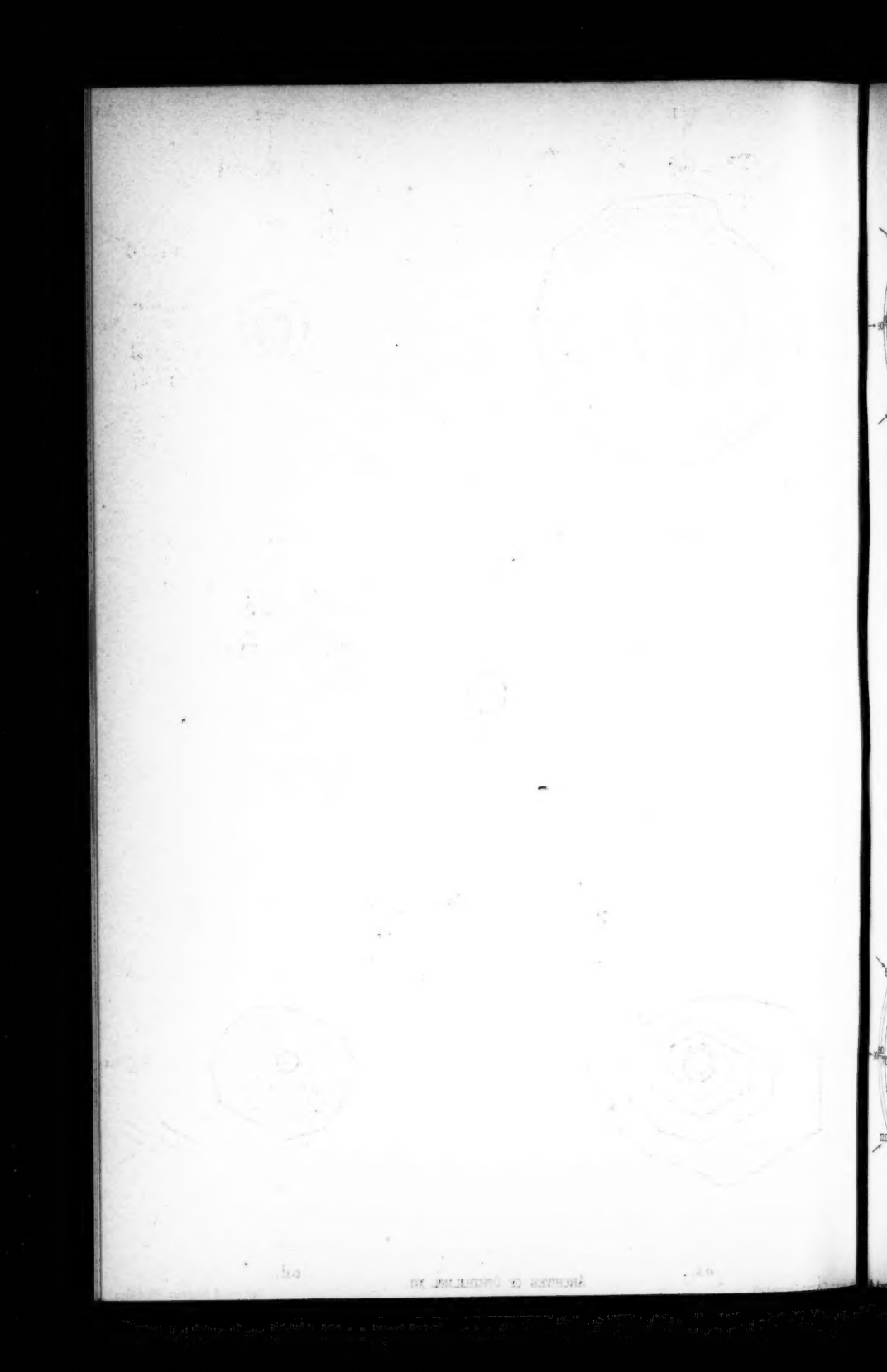

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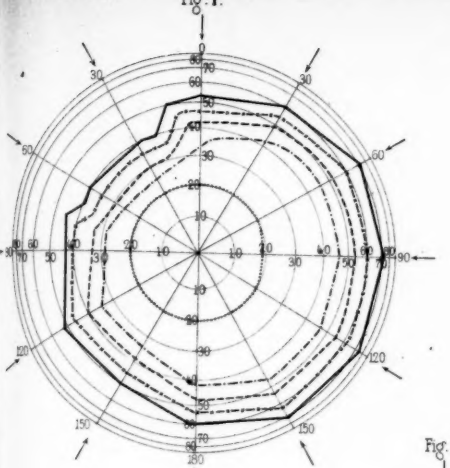

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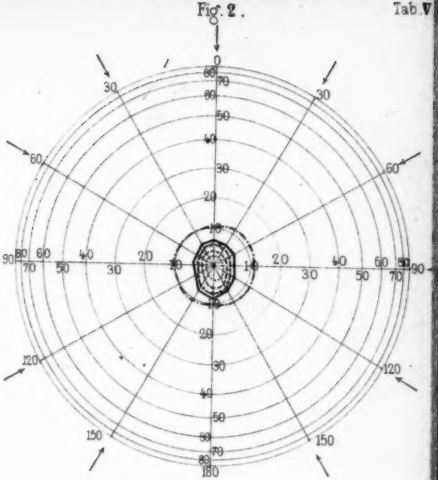

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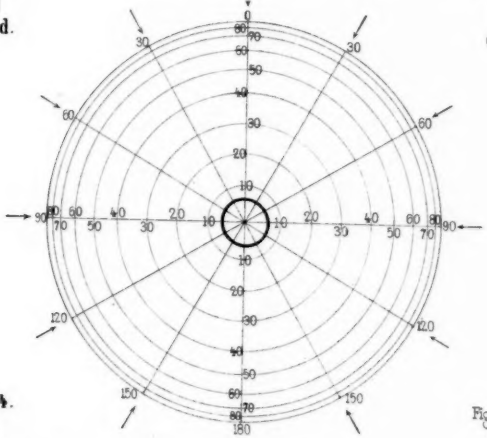

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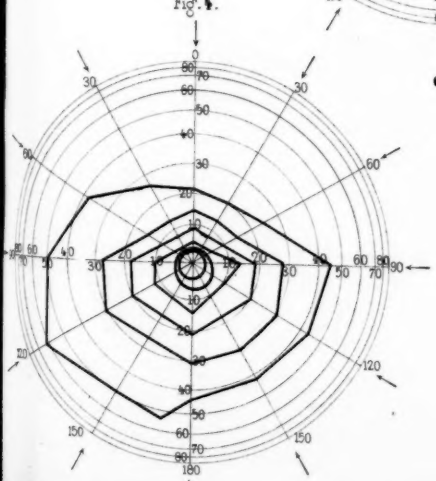

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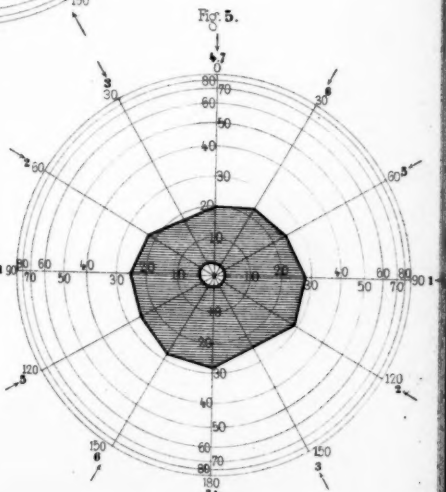

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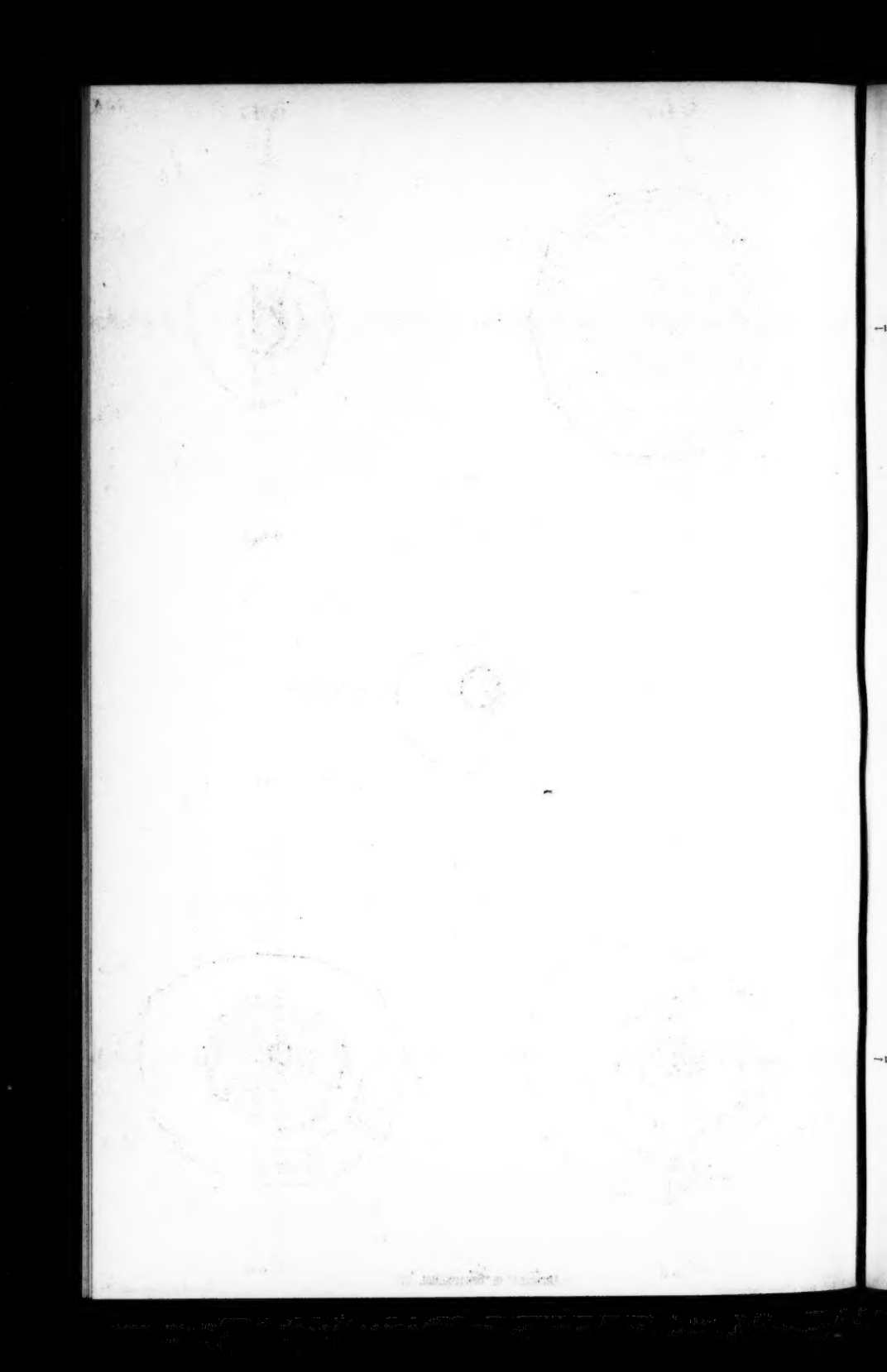
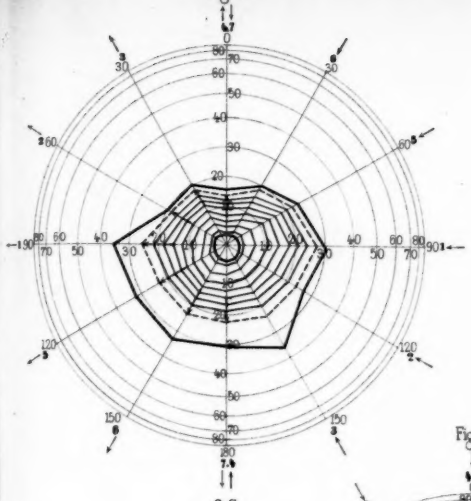


Fig. 6.



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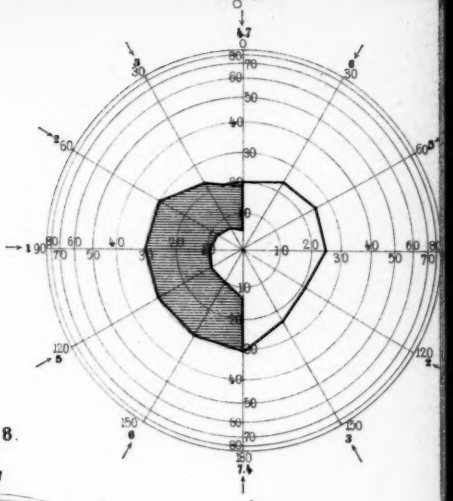

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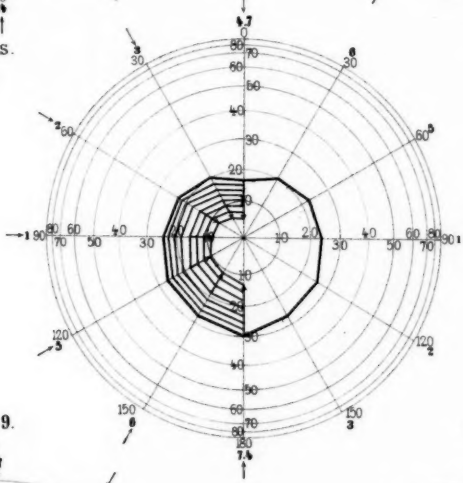

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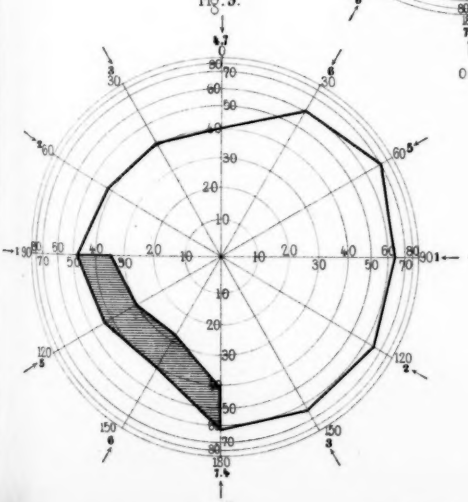

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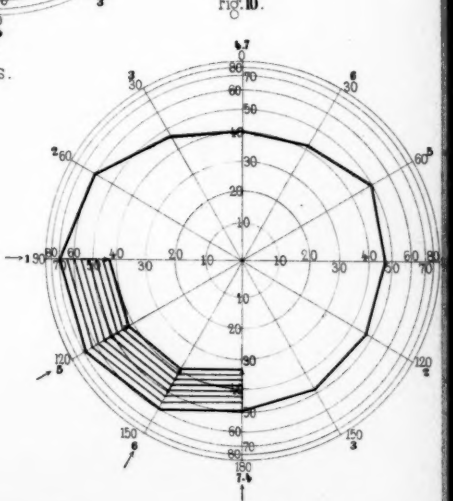

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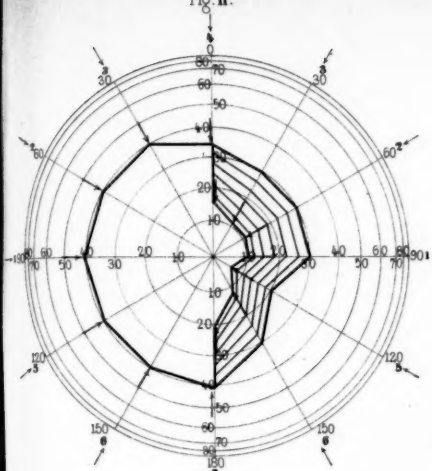

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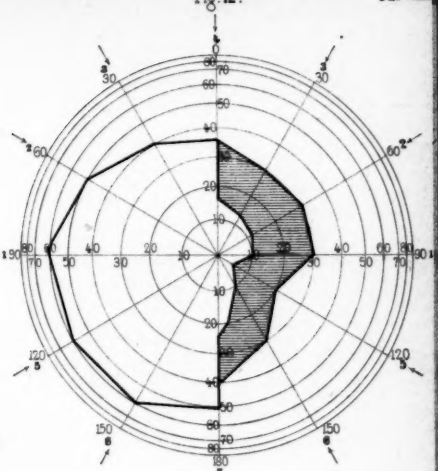

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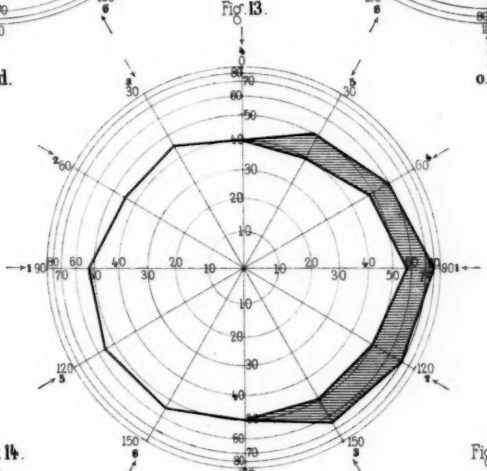

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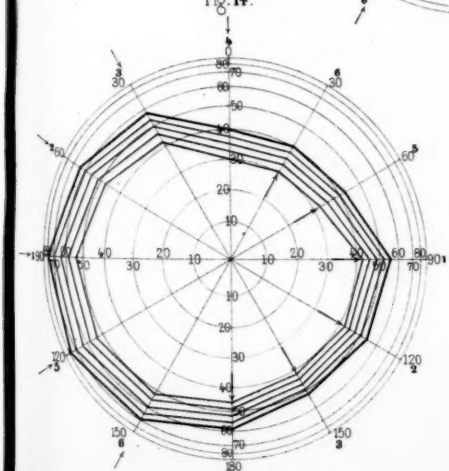

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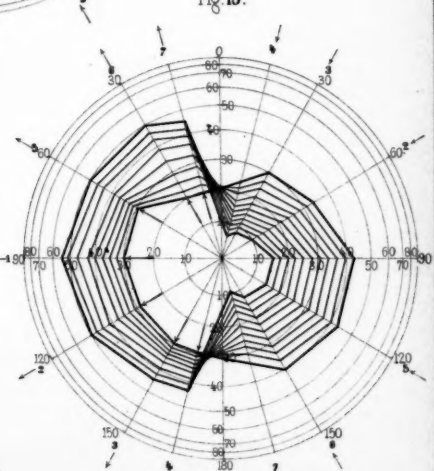

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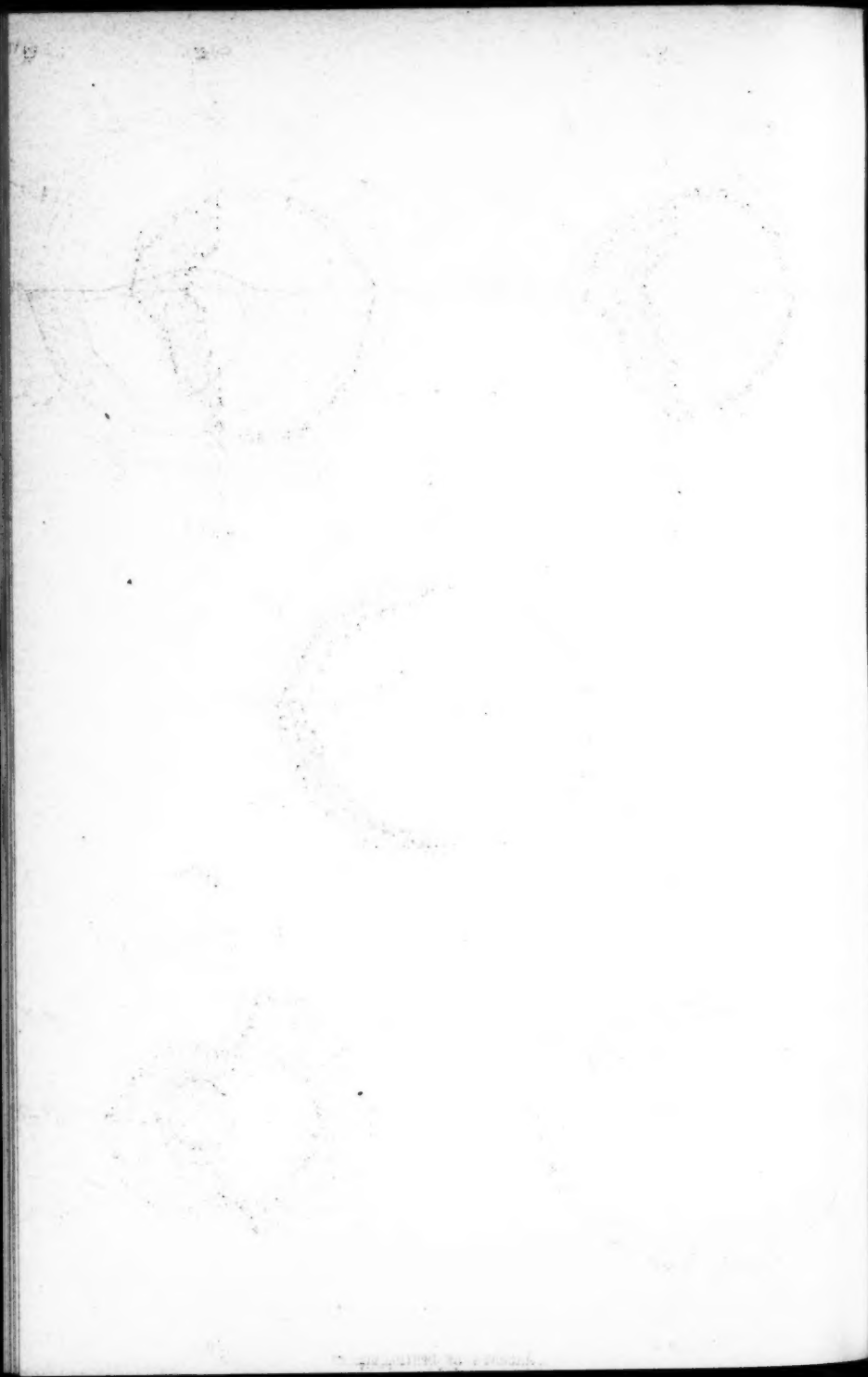

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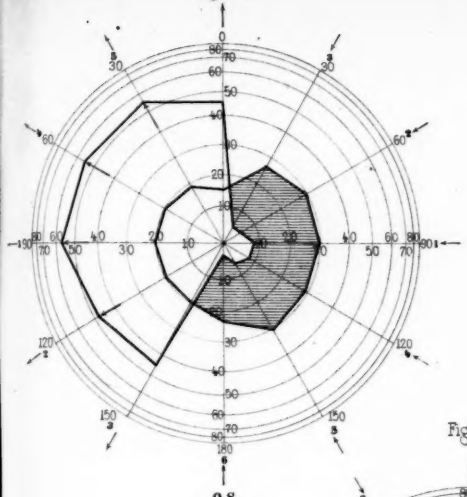

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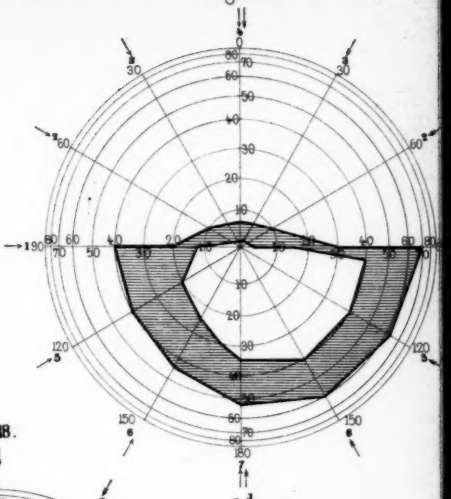

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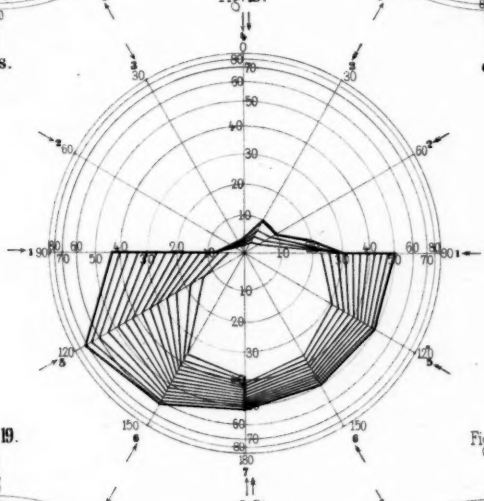

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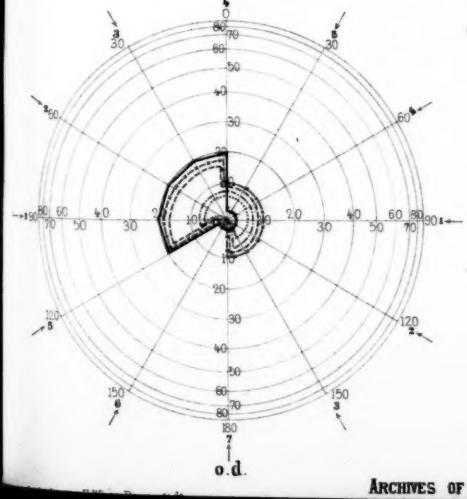

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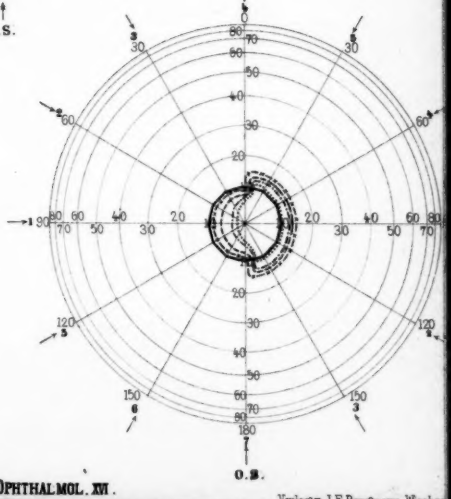

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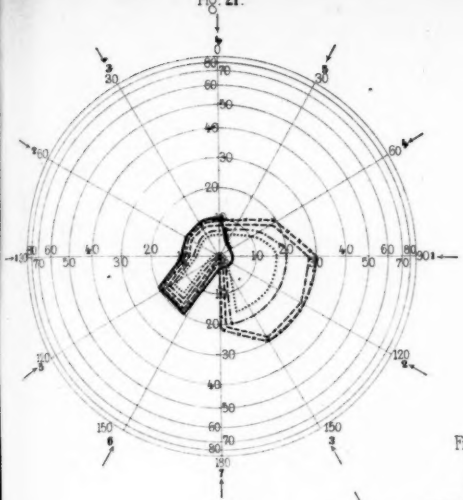

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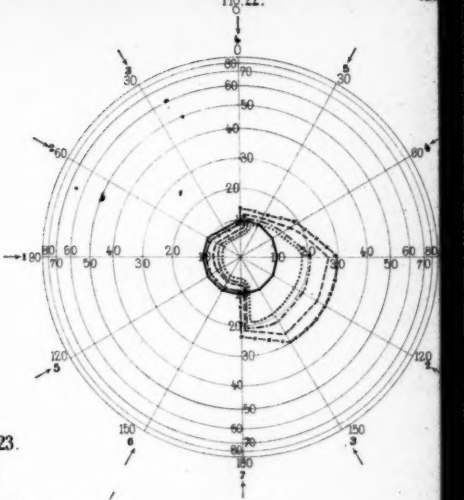

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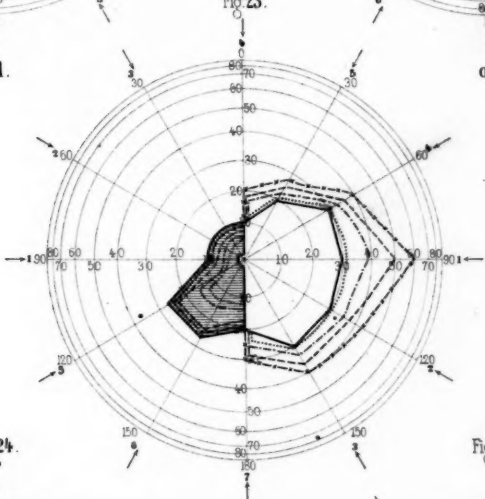

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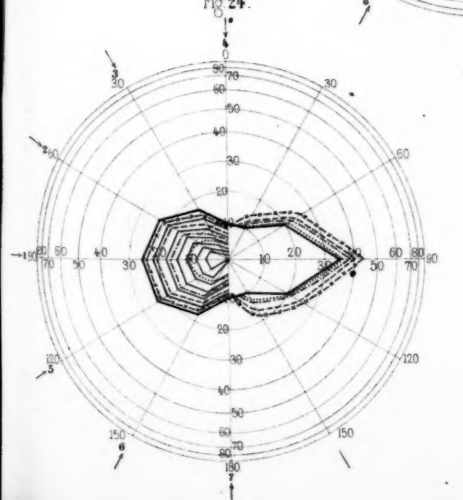

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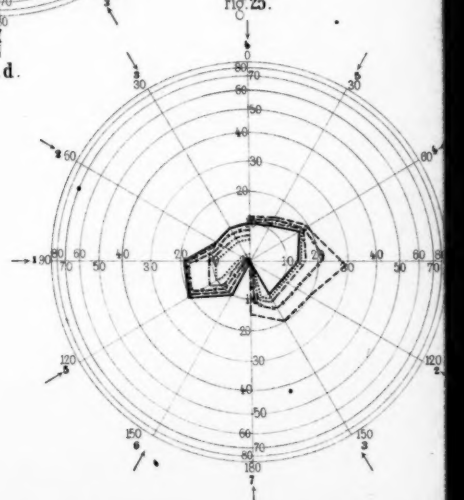

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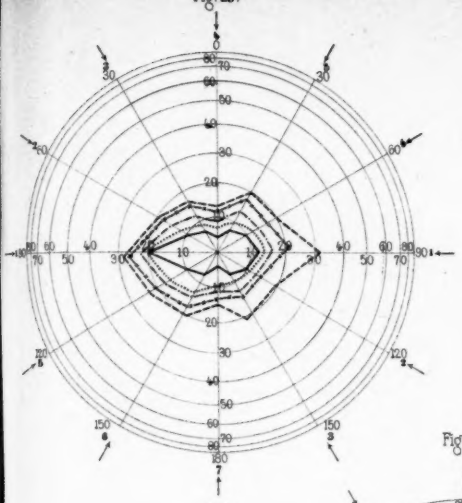

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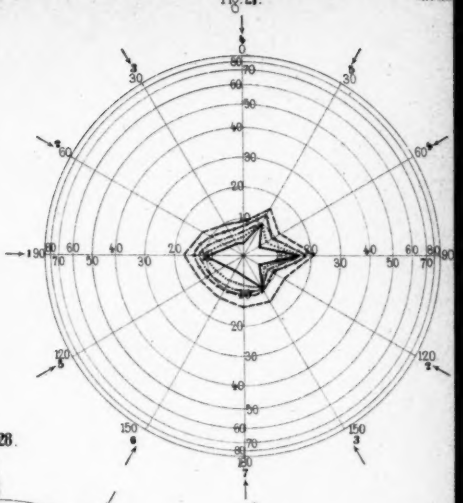

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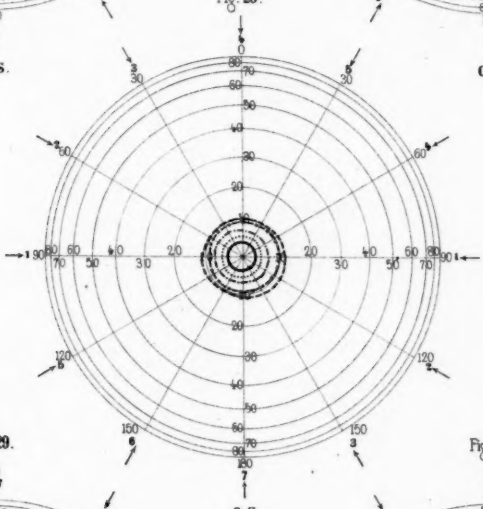

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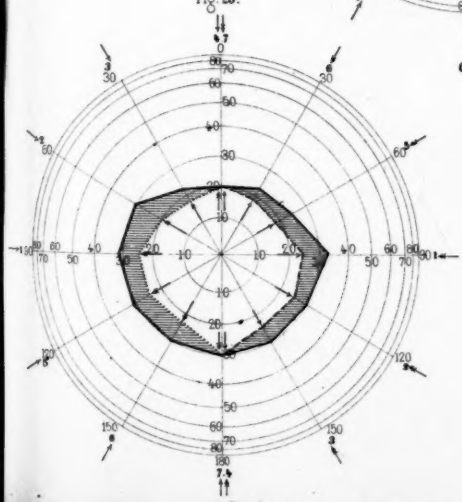

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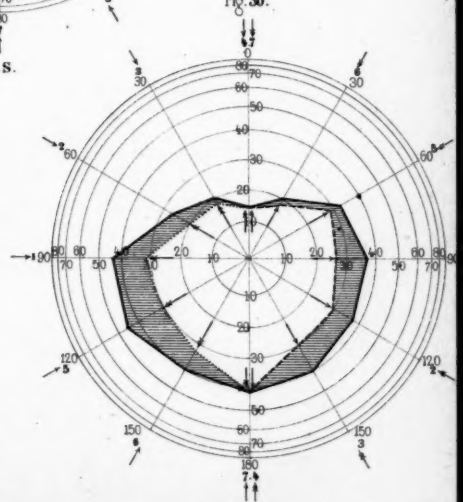

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